THE OLDEST ELECTRICAL PAPER

ELECTRICAL REVIEW

ESTABLISHED 1872

Vol. CXLV. No. 3740
29th JULY, 1949

Paying for Imports

ELECTRICAL INDUSTRY'S GREAT CONTRIBUTION

WHILST the overseas trade figures for June as a whole show the highest adverse balance since September, 1947, electrical exports at £11,034,248 are the second highest on record, imports at the same time falling from £368,238 in May to £276,557 in June. Furthermore for the first six months of the year exports have risen nearly 29 per cent, compared with the corresponding period of 1948 and there is every prospect that the targets set for the industry this year will be attained; in fact with regard to electrical machinery, exports are already being despatched at the desired rate.

It cannot therefore be disputed that the electrical manufacturing industry is at least contributing if not exceeding the share that might be expected of it in aiding the country's recovery to economic stability. That being the case, surely the industry is entitled to some consideration by the Government of any views and suggestions it may have for further extending its trade abroad.

Many Power Plant Orders

With regard to electrical machinery and other capital equipment there are likely to be few complaints at any rate for the present. Manufacturers of this class of product are still in the happy position of having plenty of orders on their books both for the home and export markets. It is greatly to be hoped that this state of affairs will long continue, but with the back-log of orders gradually being caught up and delivery dates now reduced to a matter of months as compared with years not so long ago, one must not take too optimistic a view.

When it comes to electrical goods and apparatus, however, the position is not so promising and particularly is this the case with regard to domestic appliances. Competition abroad is rapidly increasing not only with other exporting countries but also with local production. Assuming that means are found for eliminating the numerous import restrictions which are at present circumscribing business overseas, and making due allowance for quality and appearance of products, it will in the long run be the price which will influence the buyer in his choice.

Bad Influence of Purchase Tax

Hitherto it has apparently been the Government's contention that it is possible to run a business successfully on export sales alone. While this may be true in a sellers' market it has yet to be proved that, in more normal conditions when selective buying becomes possible, the backing of a healthy home market can be ignored.

Unfortunately, so far as domestic appliances are concerned the matter is still complicated by the continuing shortage of generating capacity. It is now being discovered, however, somewhat belatedly, that several appliances at any rate, the use of which has been discouraged by means of heavy purchase tax and restriction on manufacture, are in fact largely employed in off-peak

periods. Sales of other appliances subject to lower rates of purchase tax are also handicapped by the prospective buyer's refusal to pay those extra shillings or pounds for a tax which he feels must eventually be removed.

Despite the adverse conditions the manufacturer of domestic electrical appliances has put up a remarkable performance, but he is not a magician. Few opportunities remain to him for further improvements in production methods and reduction of costs. Unless the industry is to be irreparably damaged it behoves those responsible for its well-being, both for its own good and of the country in general, to take steps which will remove this intolerable handicap.

WELSH WATER POWER

At the beginning of this year the Council for the Preservation of Rural Wales appointed a sub-committee to examine the £20 million scheme of the British Electricity Authority for hydro-electric development in North Wales. The general lines of the Council's policy were made known this week, based on the committee's report, and, as might be expected, many of the proposals are to be "resisted without compromise." Nevertheless, the statement shows a certain amount of appreciation of the other side of the case not evinced by some fanatical anti-developers by indicating that, with modifications, a number of proposals would be acceptable. It does not, for instance, intend to oppose the Maentwrog expansion, while the Rheidol scheme and proposals for the Upper Conway may be acceptable if certain specified safeguards are included.

TORIES AND ELECTRICITY

In the statement of policy issued by the Conservative and Unionist Central Office it is recognized that electricity, at least, cannot be de-nationalized and so any future Conservative Government must confine its endeavours to improving the nationalized industry. It will secure this improvement by a greater measure of Parliamentary control and by decentralization of functions. It is probably unfair to expect too much detail in what is, after all, a popular exposition, but while there is general agreement that over-centralization is stultifying and must be avoided, the extent to which devolution can go and how it is to proceed is a matter not easily decided.

PROVISION OF APPARATUS

For some time past there has been a campaign in France against the provision of apparatus by the nationalized electricity supply service, Electricité de France. Apparently this has now been successful for a decree published in the *Journal Officiel* on 14th July (a significant date in France) announced the cessation of the hiring and maintenance of domestic electrical equipment by the organization. It is doubtful whether success will be achieved so easily by those who are attacking the trading structure of the British Electricity Boards. This is a Bastille with somewhat older and firmer foundations.

E.I.B.A. FINANCES

Last year a special appeal was made for substantially increased income for the E.I.B.A. to enable it to meet the growing calls on its resources. Some sections of the industry responded readily, and there was an improvement of over £4,700. Gratifying as this was, it was insufficient, and the Association has had to sell some of its none-too-large investments to pay its way. Without further funds the only course open would be to reduce the standard of benefits and impose limitations on the qualifications for assistance. Such a necessity would be regretted by all those who know the good work which the E.I.B.A. is doing and it is hoped that further increased support will be forthcoming particularly from those members of the electrical industry who at present make little or no contribution to the Association's funds.

METER CREEP

The tendency for the disc-spindle speed of house-service meters to creep at light load can be most troublesome. There is a watt-hour meter on the market which is not fitted with an anti-creep device and the absence of this means of restraint is known to have puzzled many people. The reason why it can be dispensed with is fully explained in a short article on page 201.

Portable Tools

Low-voltage Earthed Circuits for Safety

By S. F. PHILPOTT, M.I.E.E.

FEW appliances, if any, are called upon to operate under such adverse conditions of service as are portable tools. They are made to a high standard of quality, and are generally capable of giving long service without trouble. Accidents do, however, occur from time to time, and usually take the form of shock to the operator, which may be caused by a breakdown of the insulation of the tool itself or, more frequently, by faults in the connection between the tool and the socket outlet.

Theoretically, the operator is protected if the appliance is efficiently earthed, as required by the Factory Acts, and shock conditions only exist in the combined circumstance of the casing of the tool becoming alive and the earth connection inoperative. In practice, however, it is not uncommon for the earth lead to be left unconnected, or even connected to the live terminal of the socket outlet. Many tools are ill-advisedly operated from lampholders or from two-pin sockets without an earth connection. Portable tools are frequently lifted or dragged by their flexible cords, which may break or disconnect the earth conductor, or cause it to make contact with one of the line conductors.

The earth lead is invariably connected to the tool by the manufacturer, and it has become general practice to make the earth connection screw visible to the user. The diversity of plug and socket sizes effectively prevents the manufacturer from supplying the appliance ready connected to its plug which, in consequence, has to be done by the user, not always electrically trained—so accidents happen simply through wrong connections at the plug. Connection of the earth conductor to the live terminal renders the body of the tool alive. Connection of the earth lead to the neutral may be safe in one socket and dangerous in another if the phase wire happens to have been brought to the opposite side of the outlet.

In any case, full protection is only given when the earth lead from the appliance to the plug and from the socket to the consumer's earth are continuous, presupposing low resistance of the earth plate at the distribution end. It is generally considered that shocks of 200 V upwards are dangerous, those of the order of 100 V less severe and 50 V fairly safe. Considerable interest is being taken at the present time by large users, certain trade union organizations and the factory inspectors in the operation of portable tools from low-voltage sources, without detriment to their performance characteristics, particularly when the tools will be used out of doors, in damp situations, or in proximity to well-earthed metal work.

At first sight it might appear simple to use 50 V tools operated from a transformer, but the use of a very low voltage

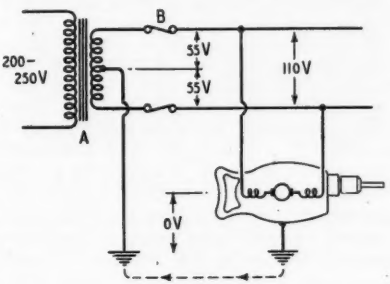


Fig. 1.—Portable tool operated from centre-tap earthed transformer

presents some difficulty, particularly with the larger sizes of tool, because armature and field conductor sizes, brush section, commutator length and cable size must all be increased very considerably in order to carry the heavier currents involved. Thus the 50 V tool is usually larger, heavier and more expensive than one for the normal mains voltage.

The flexible cable for the larger types

of tool is heavy, too, often inconvenient to handle and, unless of adequate section, may cause an undue drop in voltage. The full-load currents of typical 50 V portable tools (Table I) are often exceeded for

Table I.—Full load currents of 50 V portable tools

Type	Size, in	Amps
General duty drill	¼	9
Heavy duty drill	½	14
Portable grinder	4	16
Grinder	6	22
Drill	1	27

short periods, such as when a drill "breaks through," or the operator bears unduly heavily upon the tool.

Because of the world-wide demand, 110 V tools are invariably a standard product, dimensionally similar to the corresponding models for 200-250 V and, from the point of view of price, convenience and cost of installation, have an advantage over the specially built type for 50 V operation.

Normally, 110 V tools would be energized from a step-down transformer and by the simple process of providing a tapping at the centre point of the secondary winding and connecting it to earth the voltage of either line to earth is only 55 V, thereby combining low-voltage safety with the operating advantages of 110 V. If a transformer A (Fig. 1) with an output of 110 V is connected to the tools through the cut-outs B with the centre of the secondary winding connected to earth, and each tool also connected to earth, the arrangement will

Fig. 2.—Shock limitation to 55V with earth lead disconnected

comply with the Factory Regulations.

In the event of a fault developing within the tool, the fault current will pass through the earth wire and back to the transformer, as shown by the dotted lines. The circuit breaker will open to cut off the current to the tool.

Now, if the earth wire is not intact (Fig. 2), there will not be any circuit for the fault current, and the casing of the tool will be rendered alive, but because the *centre* of the transformer secondary winding (not one end) is connected to earth, the potential above earth will be only 55 V r.m.s. This system is simple to install and maintain, and the transformers are readily available.

In a modification of this system (Fig. 3), the centre tapping of the transformer

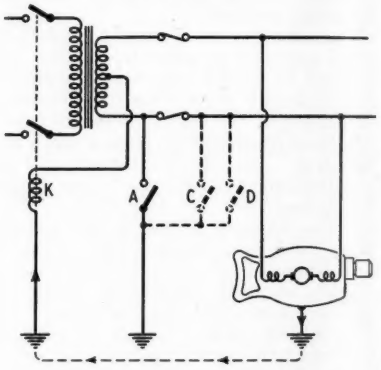


Fig. 3.—Earth-leakage protection circuit

secondary winding is connected to earth through the coil K of an earth-leakage circuit breaker, so that the appearance of only a slight leakage current suffices to trip the breaker. This renders all the tools inoperative, and the circuit cannot be reclosed permanently until the faulty unit has been located and removed. A test button is provided at A for periodic checking of the condition of the breaker. Additional buttons C and D can, if desired, be connected in parallel, as shown by the broken lines, to act as emergency stops.

The protection afforded by the above systems is dependent upon the continuity of the connection between the tool and earth, which is liable to fail at

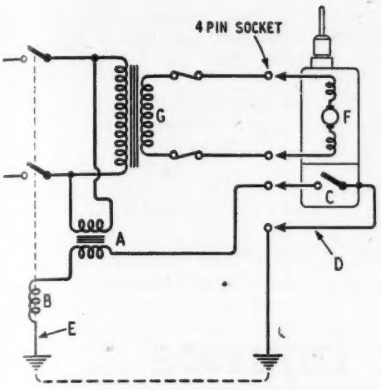


Fig. 4.—Protection by circulating "earth" current

any time. A method (Fig. 4) has been devised to overcome this disadvantage by circulating a low-voltage current continuously through the earth lead. The current also flows through the hold-on coil of a circuit breaker so that failure of the current, due to a break in the cable, results in the breaker opening and the tool becoming inoperative. Connected across the supply mains is a small transformer A, the output circuit of which includes the relay coil B, the tool switch C, tool earth lead D and the relay earth lead E. The motor of the tool F is connected either to the mains or to the reduced voltage supply obtained from transformer G. The switching is done on the low-voltage side.

The disadvantage in the employment of this system is that it calls for non-standard tools with special switching arrangements, and the provision of a four-core cable to the tool and four-pin plugs and sockets.

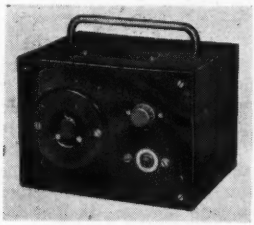


Fig. 5.—Earth lead "Terra Tertia" tester—Electro Methods

Much can be done to reduce the risk of accidents when using portable tools by periodic checking.

It is a very good plan for the tools to be kept in a store and tested each time they are issued. Three tests are in general sufficient for (1) continuity of the earth connection, (2) the insulation resistance of the windings, and (3) general running performance.

Several proprietary earth-continuity testing devices are available, most of which work on the principle of passing a heavy current at low voltage through the earth wire. If the conductor is partly severed and continuity is dependent on one or two strands only, the current will burn those out. The "Terra Tertia" tester made by Electro-Methods, Ltd., enables the tool to be plugged in to the test socket on the front of the panel (Fig. 5) and the body or frame of the tool to be pressed firmly against the plated handle of the instrument for a few seconds. From 15 to 20 A will then flow and the indicator lamp will glow if continuity is complete. If the earth lead is broken, or incorrectly wired, the lamp will not light.

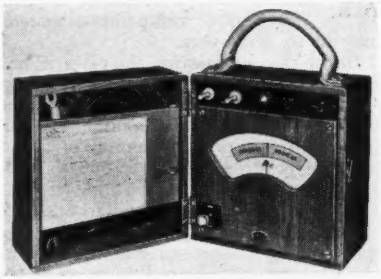


Fig. 6.—Earthing continuity tester—G.E.C.

The G.E.C. earth-continuity tester (Fig. 6) is intended more particularly for checking the resistance of the earth conductor throughout the installation. The I.E.E. Regulations for the Electrical Equipment of Buildings specify that this shall not exceed one ohm. The instrument comprises a bridge circuit operated from a dry battery contained within the case, with a moving coil meter. Instead of being calibrated in the usual way, the scale is divided into two sectors, coloured green and red, and marked below one

ohm and above one ohm respectively.

In use, one test clip is connected to the earth lead to be tested, and the other clip to the earth electrode of the system. The position which the needle takes up is a direct indication whether or not the installation complies with the regulations. The centre point of the scale, of course, indicates one ohm.

Insulation resistance is measured by one of the well-known testing sets. The accumulation of grease and carbon dust within a tool will quickly reduce its insulation resistance and values down to one megohm can be tolerated with safety.

The most convenient method of testing the running performance of a tool is to run it without load, and check the amperes or watts consumption against the maker's figure. The commutation should be checked while this test is in progress, and also the general mechanical condition as indicated by the gear noise, etc.

Industrial Injuries

Unskilled Employees and Negligence

By F. E. SUGDEN, A.C.I.S., Barrister-at-Law

A RECENT claim by a workman for damages in respect of injuries raises one or two points of general interest to employers.

In the case in question the plaintiff had entered the employment of the defendant electricity authority as a labourer and after about four years became a fitter. He acquired a certain amount of knowledge of electrical matters, but was not given any training or tuition. Subsequently he became assistant to a skilled electrician, the superintendent in the substation department of the employers' undertaking, and helped to prepare the equipment for tests which the superintendent performed at sub-stations. In carrying out these tests the superintendent did not follow the instructions laid down by the Electricity (Factories Act) Special Regulations, 1908, as amended by the Electricity (Factories Act) Special Regulations, 1944. He adopted a method which involved some danger, but which he considered was more expeditious. By a departmental letter later the workman was appointed an "authorised person" within the meaning of the Electricity Regulations to carry out without supervision the duties performed by the superintendent, and he was instructed to make himself conversant with a memorandum on the Electricity Regulations. Later, while the workman was carrying out a test at the switchboard an explosion occurred and he was injured, losing one of his hands. He brought an action against his employers claiming damages (a) at common law, for failure to provide and maintain a safe system of working and (b) for breach of statutory duty in failing to comply with the Electricity (Factories Act) Special Regulations, 1908 and 1944. The employers denied negligence and pleaded that they had complied with the regulations by providing a safe system of working and that they had expressly delegated their statutory duty to the workman. They also pleaded contributory negligence.

The Court held that the workman was not entitled to recover damages for breach of statutory duty since the duty of doing the test without supervision had been expressly delegated to him and he himself had committed a breach of the regulations.

The Court further held that the employers had not discharged their common law duty to provide a safe system of working by merely instructing the workman to read and comply with the requirements specified in the regulations as disclosed by the memorandum, and further, if they had at one time provided a safe system, it had been disregarded by long usage. Also, as the workman was not a skilled electrician and had never been instructed in the correct way of doing the work, but had always seen

his superior officers doing it in a manner that involved some risk, he was not guilty of contributory negligence in carrying out the work in the same manner.

There is an idea abroad that all actions which have occurred since 1st July, 1948, are governed by the National Insurance Act. Actually workmen can either elect to claim under the National Insurance Act or bring an action at common law for compensation in respect of pain and suffering, loss of wages and damages generally, as a consequence of the negligence of the employer.

In the case quoted the workman lost that portion of his case in which he relied on the defendants' statutory duty on the grounds that he himself knew that it was a statutory duty that certain precautions should be taken. He was, however, awarded damages of £3,000 as compensation for the loss of his hand and £767 for loss of earnings.

Thus it behoves all employers to make sure that their staff, however, experienced or qualified they may be, strictly adhere to the regulations, to which I have referred, and that they do not acquiesce in flagrant breaches by their most competent staff who consider that they can carry out work without taking the necessary precautions.

The only ways in which employers can absolve themselves from liability are either by proving that the workman was himself negligent or that the workman was, along with the employers, jointly responsible for any injuries that he may have suffered.

There is a further point which I may mention: that is, if the accident occurred before July 1st, 1948, or if there is now a recurrence of incapacity due to the injury and a Declaration of Liability has been issued by the Court, on the application of the workman, before July 1st, 1948, then any further claim which may be made is not governed by the National Insurance Act but by the original Workmen's Compensation Act.

Electrical Industries Benevolent Association

Grants Increase Faster than Income

IN spite of the extended social services, calls upon the funds of the Electrical Industries Benevolent Association reached a new record of £31,366 last year. This was £9,273 (41 per cent) more than in the previous year and nearly double the 1946 total. Thus, although income increased by £4,700, there was a deficit of £4,005. To meet this and the Broome Park capital payments, the Association reluctantly had to sell investments to the extent of £13,489 put away for times of depression.

Mr. E. C. Holroyde

During last year 398 applicants were dealt with, compared with 201, 253 and 319 in the years 1945-47. Tuberculosis cases figure largely in this increase, accounting for one in every seven of the Association's beneficiaries. Help given by arranging for private sanatorium treatment, because of the long waiting list for accommodation in public sanatoria, undoubtedly resulted in the saving of a number of lives. Steps are taken to obtain contributions towards the heavy expenses from other bodies, so reducing the amount paid out by the Association in grants. This, however, often entailed considerable office work, making the administration expenses appear at first sight relatively high in relation to grants.

Considerable progress was made during the year in developing the home for old people at Broome Park, although a number of legal and other complications were encountered. It has been decided to use the gift of £5,000 from the Electrical Wholesalers' Federation, given in memory of their late Director, Mr. A. Albrecht, for building bungalows at Broome Park when conditions permit.

Mr. E. C. Holroyde (Crompton Parkinson, Ltd.) has been elected president for the ensuing year and Mr. Leslie Sharp (Venner Time Switches, Ltd.) has been re-elected chairman of the Court of Governors.

Mercury Lighting.—Berwick Town Council is to spend £2,123 on improved street lighting. The borough surveyor has prepared a scheme for 41 mercury vapour lamps from the Scotsgate to the Highfield estate and eight at the south end of the Royal Tweed Bridge.

Views on the News

By REFLECTOR

AN interesting letter on the possibility of killing whales electrically appeared in *The Times* a few days ago. Mr. C. W. Hume, chairman of the Universities Federation of Animal Welfare, stated that United Whales, Ltd., in co-operation with the General Electric Co., Ltd., at considerable expense fitted out a catcher with electrical equipment for trial during the season just ended. The results were very satisfactory and it can be said that electric whaling has a very hopeful future though there is still development work to be done. Technical improvements are being worked upon and Mr. Hume says that it is gratifying that the electrical equipment may well replace, sooner or later, the old-fashioned and excessively barbarous explosive harpoon which is in general use. The G.E.C. tells me that it is too soon yet to disclose results of the experiments and that publication must await further trials planned for next season.

★ ★ ★

It would seem that there is much to be said for living out East. Chinese customers and friends of the British General Electric Co., Ltd., Hong Kong, were recently entertained at dinner, the sumptuous repast of ten courses including such delicacies as lobster salad, fried pigeon meat, shark's fin, stewed awabi, roast duck, steamed garoupa and stewed sliced chicken! To me, whose choice of dishes and appetite are Government-controlled, such entertainment reads like an excerpt from the Arabian Nights, although I doubt whether such a repast would have been within my pre-war capacity.

★ ★ ★

To study the strange habits of wild life it is not necessary to go to some remote nature reserve. "Animals in Voltageland," savouring of Lewis Carroll, which appears in the latest issue of *Southern Electricity*, shows that there is no better job for this purpose than that of an electrical maintenance man. What, I wonder, is the attraction of the inside of an electric motor to mice? Several cases of trouble were found to be caused by such intrusions, and in one instance when the motor of an "Essex" mill was dismantled 22 dead mice were found inside. The partiality of squirrels for lead-sheathed 33 kV cables was the cause of several "blow-outs," but not to the culprits it appears. Other incidents recorded are mainly concerned with birds nesting in electrical apparatus.

★ ★ ★

It seems to me that it is becoming fashionable to object to overhead lines. Billingham-on-Tees Council recently requested the North-Eastern Electricity Board to lay a proposed 66 kV cable from Haverton Hill to Seal Sands underground, although it had approved the plan for an overhead line in 1947. The Board pointed out that the necessary materials had been ordered and because of the special construction of the line these could not be used elsewhere. The Council has now decided to revert to its original decision and agree to the erection of the overhead line.

★ ★ ★

Although electrical matters are every day in the news, there is surprisingly little knowledge of the technicalities of the industry among the lay Press. Yet another example of this came to my notice last week. A North Devon newspaper, reporting the plans of the South-Western Electricity Board, mentioned the proposals to construct 33,000 V and 11,000 V lines. To make an impressive sub-title these were added together to make 44,000 V. At any rate the arithmetic is exemplary!

★ ★ ★

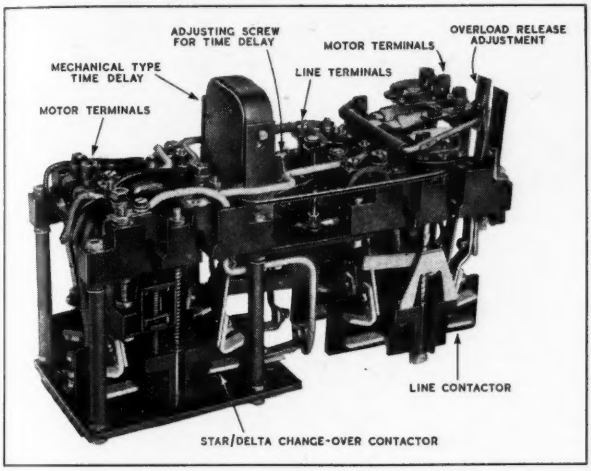
A few months ago I referred to the first issue of the Royal Naval Electrical Branch's official magazine, *Live Wire*. I am glad to hear from the editor, the Rev. W. G. Sandey, C.F., R.N., that my note brought inquiries from R.N.V.R. officers in many parts, including Brazil and Canada; in fact, the demand for copies exceeded the supply. The second issue has now appeared and is again of a high standard, the contents including some clever verses and sketches.

Motor Control Gear

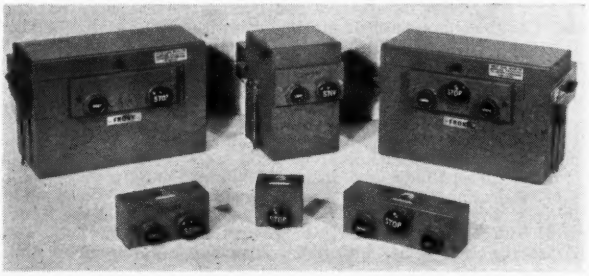
DESIGNS FOR OVERSEAS SERVICE

RECENT overseas orders for electric motor starters made by Newman Industries, Ltd., Yate, Bristol, include one for several thousands for a Swedish firm.

The starters are fully automatic and are suitable for control by built-in push buttons or any type of single-pole switch, such as a float switch, etc. The range includes direct-on-line and direct-on-line reversing starters up to 7½ h.p. and star-delta up to 12½ h.p.



Interior mechanism of a star-delta starter



A group of starters and push button stations

The operating coils can be wound for all normal overseas electricity supplies and are easily interchangeable.

The starter units for each type are self-contained assemblies mounted into totally enclosing pressure die-cast casings, permitting the switch contacts to operate immersed in switch oil or as air break for the lower ratings. The main casing is provided with a detachable back box having the necessary holes for fixing the unit to a wall, also holes with knock-outs for cable conduits or other cable terminations of suitable size. This form of casing construction with detachable conduit box has distinct advantages from the point of view of installation and maintenance and permits all installation work to be carried out without having the starter unit in position.

Each starter unit consists of double-break vertical lift contactors with easily renewable silver-plated contacts and inherent no-volt release, three indirectly heated bi-metal operated adjustable thermal overload release trips and a common hand reset trip switch. The trip switch is calibrated in motor amperes and will operate

on 25-30 per cent excess current. The operating time varies inversely with the current. The contactors and devices incorporated in the starter units have been type tested for 500,000 operations, after which they have still operated satisfactorily without replacement of any major part.

One of the assembly lines of the Newman control gear factory

Features of special interest to overseas buyers are the complete interchangeability of all spares, due largely to the accurate production methods, the rigid inspection control imposed at all stages, and the fact that every starter is electrically and mechanically tested at three separate stages during the assembly processes. To ensure long life and reliability special attention has been directed to detail design. For example magnet coils are provided with paper interleaving between layers, and when complete are subject to varnish impregnating to ensure homogeneous construction; the faces of the operating magnet are carefully ground to secure silent operation; and contacts are silver plated to eliminate undue heating during prolonged periods of operation. Inspection of the working parts is readily undertaken by removing the upper and lower sections of the casing without the need of removal of the unit from the wall or other situation.

Conservative Policy

LAST week the Conservative and Unionist Central Office published a booklet with the title "The Right Road for Britain" (price 6d) in which is set out the Conservative Party's policy in the event of its returning to power.

One section deals with the Party's attitude towards nationalization which, it claims, has proved expensive, rigid and clumsy, and ruthless and inexorable in so far as dealings with customers and employees are concerned. The Party, it is said, will restore free enterprise where that is practicable. It has no other course but to leave some industries nationalized, but it will radically overhaul their organization to make them more human, less centralized and more efficient.

As regards gas and electricity, it is said that it is too early yet to decide upon the final form of these industries. It is said, however, that the present Area Boards and Consumers' Councils cover too large an area to be in track with local opinion. "We shall review the possibilities of introducing in each district representation of local opinion in a suitable form."

Generally, it is intended to make more use of independent price tribunals; to strengthen Parliamentary control of the accounts of nationalized undertakings; to place these undertakings within the purview of the Monopolies Commission or some similar body; and to confine Ministers' power of appointment to the main boards.

It is recognized that "technical difficulties, not rural prejudices, have held back the wider use of electricity in the countryside. . . . A Conservative Government will see that the countryside gets a liberal share in the nation's supplies of electrical equipment."

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Telephone Line Protection

I NOTE that in the article on this subject in your issue of 22nd July, in Test I the telephone dial was earthed through a 2,000 ohm resistor intended to simulate a man dialling. That appears to be a very low value to choose for this purpose. Since reading this article I have measured the resistance from hand to hand of several men with a 250 V "Megger" and found it to vary between 20,000 and 30,000 ohms. The tests were made on a very hot day when one would expect to obtain a lower value, due to perspiration, than in winter. Incidentally these values confirm some tests I made some twenty years ago by several methods which substantially gave the same results.

It is possible that the a.c. resistance of the human body may be much lower than the figures I have quoted. Unfortunately, I have not access to a suitable a.c. bridge at the time of writing, but should be interested to know whether the P.O. research engineers have made measurements of the a.c. resistance at 50 c/s and found it to be of the order of the value of the resistor used.

J. F. PERRIN, A.M.I.E.E.

Carlisle.

Disposal of Fluorescent Tubes

WE wonder if any other contractor has had the same experience that has just befallen us in connection with the disposal of worn out fluorescent tubes.

We have previously been in the habit of breaking them up and putting them in the dust bin, and the dustmen have always taken them away without comment. One of our staff suggested that the dustmen might be pleased if, instead of breaking up the tubes, we put them ready for collection unbroken. We decided to do this, but the dustmen refused to take them. We reported this to the local Council which promised to collect later.

To-day we received a visit from a peak-capped official who said he had called in reference to the above; we thereupon produced nine defunct tubes and he edged away from them as though they were about to explode. He then called into the shop two hefty men wearing rubber gauntlet gloves and they very delicately carried out the tubes. We are now awaiting a bill charging us for collection.

We would be interested to know what other contractors do in like circumstances, and also to know if it would not be possible to impress upon local authorities that fluorescent tubes are definitely not dangerous to health as seems to be assumed. It appears that some local authorities have made a regulation that dustmen when handling these lamps must be protected by rubber gloves.

WADDINGTON & GOODWELL, LTD.,
CHAS. W. WADDINGTON,
Director.

London, E.C.1.

"Pyrotenax" and I.E.E. Regulations

IN your issue of 24th June there is a report of a discussion on Mr. P. G. Wallis's paper "The Electrical Contractor's Place in the Industry and his Service to the Public."

We noticed with chagrin that Mr. F. W. Purse, hon. director, National Register of Electrical Installation Contractors, is reported as follows:—

> "Mr. Purse quoted 'Pyrotenax' cable and the 'Wylex' flat-pin plug as examples of good equipment which did not conform to I.E.E. Regulations and would have had to be rejected if the Regulations were compulsory."

This statement is, of course, not correct, but would have been so in the early days of our manufacture. We wrote to Mr. Purse, who replied:—

> "What I did say was to the effect that 'Pyrotenax' cable, when originally marketed, did not comply with I.E.E. Regulations, and that, therefore, had such Regulations been mandatory, the public would have been denied the use of what has proved to be a highly efficient form of cable."

We expect you will agree with us that readers of your report may get an entirely wrong impression about our products in present times, and that this could be

harmful to our business, and we shall be obliged if you could find it possible to print a correction of this statement.

C. B. GRIFFITHS,
Assistant Sales Manager,
Pyrotenax, Ltd.
Hebburn, Co. Durham.

Eye Strain

ON page 81 in your issue of 8th July there is a description of a light diffuser introduced by the statement: "It is well known that artificial light is one of the major causes of eye strain." I feel sure you will appreciate that this statement is a generalization which is not true, and that it would be unfortunate to let it stand without correction.

It is, of course, well known that discomfort—commonly referred to as "eye strain"—is occasioned by badly designed artificial lighting, as it is also by natural lighting in interiors having badly designed fenestration, but artificial light *per se* is not a cause of eye strain. It is, of course, obvious that the words to which I refer were not intended to mean what they say, because, if artificial light were a major cause of eye strain, the diffuser you describe would be useless, since the light emitted by fittings equipped with it is still artificial. Nevertheless, to prevent any possible misinterpretation, I hope you will publish this letter.

G. F. COLE,
Secretary,
Illuminating Engineering Society.
London, S.W.1.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Mr. Langford-Holt asked the Postmaster-General, in view of the desirability of increasing television linage above the 405 at present in use, what alteration would be necessary to transmitters and receivers when this change was made.

Mr. Paling said that entirely, or almost entirely, new transmitters and receivers would be required for any worth-while increase in the number of lines. He did not agree that any such change would be justified for some years to come.

Severn Barrage

Replying to Mr. Peter Freeman and Mrs. Middleton, Mr. Whiteley, Parliamentary Secretary to the Treasury, said that preliminary work was being done towards the building of the model of the estuary of the River Severn; the building itself would begin when the new Hydraulics Research Station was ready. A site for the station had been chosen and negotiations for its acquisition were proceeding.

Coal Saving from Water Power

Replying to Mr. Keeling, the Minister of Fuel and Power (Mr. Gaitskell) said he understood from the British Electricity Authority that the estimated additional annual output which would be obtained from the extension of the existing catchment area at Dolgarrog and Maentwrog now proposed was 36 million kWh which, at the present average consumption of coal in thermal stations, would represent an annual saving of 24,000 tons of coal. If the six major new schemes which were at present being investigated were developed, it was estimated that a further additional average annual output of 520 million kWh would be obtained which would be equivalent on the same basis of calculation to about 350,000 tons of coal.

Glasgow Transport

Replying to Mr.Carmichael, the Minister of Transport stated that the British Transport Commission had informed him that it proposed to set up a committee of experts under the chairmanship of Sir Robert Inglis to report to the Commission on the transport requirements of Glasgow and adjacent areas and to make recommendations. The committee would work in close co-operation with the Corporation of Glasgow. The membership of the committee and its terms of reference would be announced soon.

Consultative Committees

Mr. G. Williams asked the Minister of Fuel and Power if it was his intention to receive nominations from ratepayers' associations for appointment to consultative committees in connection with nationalized services.

Mr. Gaitskell replied to the effect that the Electricity Act, 1947, and the Gas Act, 1948, made provision for adequate local authority representation and he did not consider it necessary to appoint representatives of ratepayers' associations as well.

Railway Signalling Indicators

Types Commonly in Use

By H. C, TOWERS,
M.I.E.E., M.I.R.S.E., M.Inst.T.

THE electric signal repeater is perhaps not very well known, and although it has been in use for many years its scope has been wide.y extended during the last few decades. This is due to the development of electrical signalling systems permitting signal cabins to control increasingly large areas. Many types of electrical indicators are used in

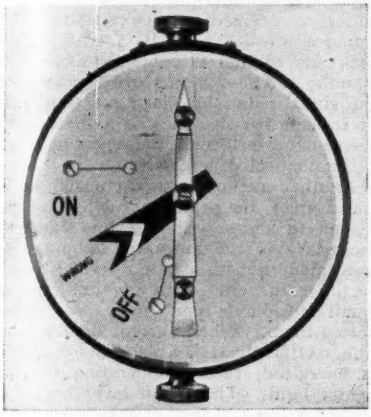


Fig. 1.—Signal arm indicator

railway signalling circuits, but generally speaking they all operate on either of two principles, the illumination of an electric lamp or the operation of a delicate movement by magnetic means.

The latter is almost exclusively used in block instruments to indicate "line blocked," "line clear," "train on line," or other similar information. Single unit indicators are used for repeating track circuits where there are not sufficient in use to warrant an illuminated diagram.

In the case of signals that cannot be seen from the signal cabin, it is essential for the signalman to know that the arm has responded correctly when the lever is operated. More important still, he should be satisfied that it has returned to "danger" when the lever is returned to normal. It is also necessary that he should know whether the signal lamps are burning correctly at night.

The general rules on this matter for the Indian Railways are similar to those of the Ministry of Transport (England), but briefer. They state that "the arm and light of any fixed signal which cannot be seen from the place from which the signal is worked shall be repeated to such place by an efficient electric repeater."

An indicator for repeating an isolated warner of distant signal (Fig. 1) consists of a magnetic needle suspended inside a coil. This needle is attached to a spindle driving a miniature signal arm. When current flows through the coil in one direction the arm assumes a horizontal position. When no current flows it returns to a neutral position marked "wrong" or "out of order" Current flowing in the opposite direction causes the arm to be deflected downwards to the "off" position.

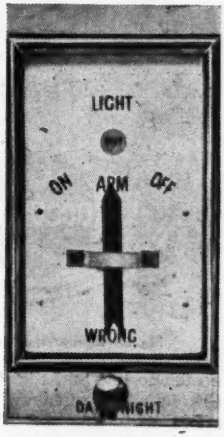


Fig. 2.—Signal arm and thermally operated light indicator combined

On the signal post, fixed level with the signal arm, is a box containing contacts which are operated by the signal arm. These contacts act as a pole changer and reverse the connections to a battery located at the bottom of the signal post. Usually one line

wire and an earth return are used and connected to each side of the coil repeater. When the arm is at danger the current flowing maintains the miniature arm in the "on" position. When the signal is pulled off, the contacts on the arm reverse the battery connections and consequently the direction of the current, deflecting the miniature arm to the "off" position. Some railways use an "on" and "off" indicator which consists of a circular aperture behind which is a flag bearing the words "on," "out of order" or "wrong," and "off."

The repeating of the signal lamp is effected by a thermal switch operated by the heat given off by the lamp. Contact is maintained when the lamp is alight and and broken when it is extinguished. The light indication "in" and "out" is operated by a simple needle movement of the type already described. Usually a separate wire and batteries are used for this circuit.

The latest type of light and arm repeater circuit requires only one line wire. The two coils are connected in series, one terminal of the instrument being connected to line and the other to earth. At the signal a resistance is connected in series with the line wire and is short-circuited by the thermal switch. When the light is out, the resistance is in series with the line, limiting the current so that it will only operate the miniature arm in the repeater. When the lamp is lit the thermal switch operates, short-circuiting the resistance and causing both the arm and light indicator to operate.

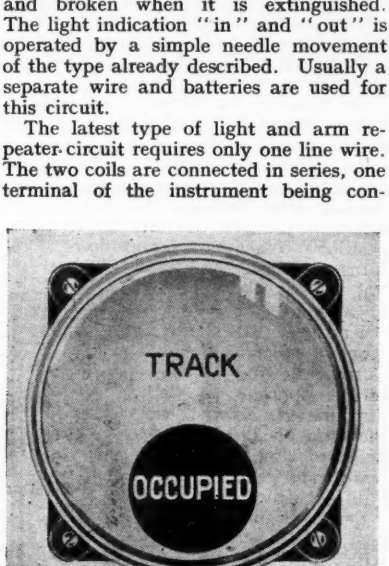


Fig. 3.—Banner-type track indicator

On some railways luminous indicators are employed instead of battery operated ones, but only when an electricity supply is available and electric signal lamps are used.

All coloured light signals are electrically repeated in the signal cabin. If they are controlled from a mechanical lever frame, indicators are used. If worked from a power frame they are repeated at the back of the miniature levers. The signal aspects are controlled by relays operated by the signal levers. The operating circuit is usually 110 V a.c., and each signal aspect has a 110/12 V transformer fixed in the signal. The signal lamps are 12 V 14 W with double filaments so that if one fails there is a standby. These lamps are repeated in the signal cabin by placing a resistance or transformer in series with the line to the signal transformer, the repeating lamp being connected across it.

Another method is to use a 100/12 V transformer, the primary of which is connected in series with the line and the secondary to the repeating lamp. The most modern method is to use small metal rectifiers in series with the line with a small telephone-type relay connected across them. When current flows in the line, rectification takes place and the relay is energized, thereby operating the repeater light. The signal lever backlock circuit is also arranged in association with the relay so that the lever cannot be replaced to normal should the red signal lamp burn out. The defect is thereby immediately brought to the signalman's attention.

With the banner-type indicator (Fig. 3), which is used for repeating the condition of track circuits in signal cabins, the energized position indicates "track clear" and the de-energized "track occupied." It is generally employed where only one or two track circuits have to be repeated.

If several track circuits are in service, an illuminated diagram is used which consists essentially of a diagram of the area under control. Normally it is illuminated, the passage of trains being indicated by the extinguishing of that part of the diagram corresponding to the position of the train.

Some railways favour the normally extinguished diagram, which is an advantage where battery power is in use. The first track circuit shown on the diagram in the approach direction sometimes works in conjunction with a buzzer so that the signalman is informed of the approach of a train should the indication on the diagram have escaped his notice. A large number of these diagrams are used on the Bombay, Baroda & Central India Railway.

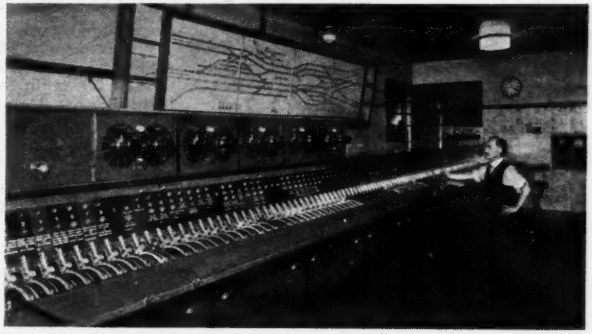


Fig. 4.—Illuminated track diagram in a London Transport signal cabin.

Illuminated diagrams are made of different materials according to taste or climate where they are to be used. An all-metal diagram with the plan painted on the front is suitable for some countries, but not in sandy places where high winds are experienced as the track plan will be quickly rubbed away by the blasting effect of the sand. A popular type of diagram has a wooden case, while the plan is painted on thick drawing paper and mounted between two sheets of glass, one clear and the other frosted. Usually the front is hinged to permit replacement of the lamps, which are housed in tin masks to prevent light leaking from one track to another. The clear glass, however, is inclined to be reflective, and a recent development is the use of an acid-washed glass which is non-reflecting. This has been adopted by the London Transport Executive.

Some railways which use paper diagrams under glass have the diagrams painted on black paper, as it is more distinct than the white variety and restful to the signalman's eyes.

NEW BOOKS

Principles of Servomechanisms. By G. S. Brown and D. P. Campbell. Pp. 400; figs and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 30s in U.K.

Although this volume is not an advanced mathematical treatise, the student or engineer for whom it is written should have a mathematical knowledge almost to degree standard if maximum benefit is to be obtained. It starts by introducing the reader to closed loop systems, giving a useful summary of analysis and synthesis procedure. This is followed by some simple examples of servomechanisms, discussing their transient response to a step function disturbance. The authors then refer to Laplacian methods, and although the account is not comprehensive the very clear explanation should help to dispel any fear students may have of operational calculus.

The subject of the sinusoidal response of closed loop systems is then discussed, emphasizing the importance of this tool to synthesis. At this stage the reader is ready to learn how the properties of closed loop systems, which are subjected to sinusoidal disturbances, can be used for system synthesis, but first a chapter is inserted which deals with equivalent circuits and system and block diagrams. It is really the liaison between the iron and steel of servomechanisms and their theory of operation.

The following introduction to synthesis outlines the procedure for obtaining the non-frequency variant K, which represents the overall gain of a closed loop system having a transfer function KG(jw). After considering the frequency variant G by the loci and logarithmic methods, the authors deal briefly with the synthesis and design of servomechanisms intended for follow up and regulation, together with multiple disturbances, other than those occurring at the input.

A particularly useful section of the book

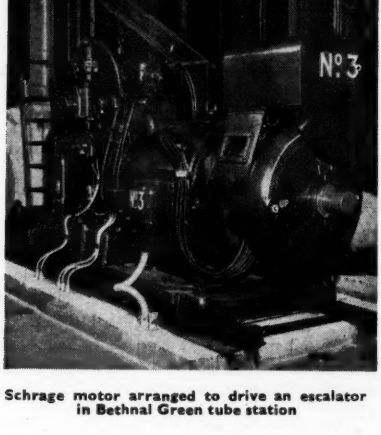
is concerned with experimental studies in servomechanisms. The final chapter describes an original method of approximating the transient response of a servomechanism from its frequency response by a rapid means of performing the approximate inverse Laplace transformation of the frequency function. The concluding pages provide problems (without answers), which should assist the serious student. There are also four pages of bibliography and four-figure tables of $\frac{\sin x}{x}$, which can be used for the determination of the transient response of a servomechanism from its frequency response.

Without doubt this is an excellent book, which is a very welcome addition to the all too few books on this highly important and rapidly advancing subject.—R. S. M.

Escalator Drive Practice

USE OF THE SCHRAGE MOTOR ON LONDON'S UNDERGROUND

IN the past all London Transport escalators have been driven by d.c. machines, but as the type of a.c. motor most suitable for this purpose is now well developed it was felt that, with a view to future developments, some practical experience should be gained in its use. Accordingly, one of the new escalators at Bethnal Green Station has been equipped with an a.c. commutator motor and control gear.



Schrage motor arranged to drive an escalator in Bethnal Green tube station

This particular escalator has a rise of 30ft and is normally arranged to run at a speed of 120ft/min. Three other speeds are required; an "inching" speed of approximately 30ft/min for maintenance and inspection purposes, a halfspeed of 60ft/min for use in connection with photoelectric cell control, and an overspeed of 150ft/min for the purpose of checking the overspeed governor adjustment. On longer machines a fifth speed is required, as the maximum speed permitted in the "down" direction is less than the maximum for the "up."

The equipment, supplied by the British Thomson-Houston Co., Ltd., includes a Schrage a.c. variable speed commutator motor which is continuously rated at 25 h.p. and has a maximum rating of 40 h.p. The speed range is 1,190 to 250 r.p.m. and the power supply is at 650 V three-phase 50 c/s. The speed of the motor is varied by altering the position of the brush gear, which consists of two sets of brushes that may be rotated in opposite directions through an arc of about 40 deg. This is done by a small pilot motor which is automatically operated by the control gear. From the operating point of view the machine is exactly the same as other London Transport escalators in that it can be started and stopped by means of the special key with which the traffic staff are supplied, and has the usual emergency stop switches at top and bottom for use either by passengers or staff. It is also fitted with photoelectric cell control similar to other escalators at stations where the traffic during the slack hours is very light.

This particular type of electrical equipment was chosen in preference to the a.c. commutator motor in which the speed is controlled by a variable induction regulator, as the latter would have involved additional equipment, a feature to be avoided as far as possible in view of the limited space normally available in machine rooms.

In considering new installations it must be borne in mind that the a.c. supply for most London Transport substations is at 33.3 c/s, although at some it is at 50 c/s. Equipment must, therefore, be suitable for use on either of these frequencies and for conversion from one to the other if such an alteration in the supply should take place.

Motor-Driven Plant

Calculation of Accelerating Time

By D. NIELD*

CERTAIN classes of drive can fail because of incorrect specification or design of induction motors, particularly those driving equipment which has large inertia, such as boiler house fans and high-speed gas boosters.

The period of time required to accelerate such equipment from rest to full speed is of the utmost importance and it is necessary to make some estimate of this time when the induction motor is designed. Although the considerations involved are mainly of a mechanical nature, they may considerably affect the electrical design of the motor.

The calculation is made mainly so that the correct type of starter can be

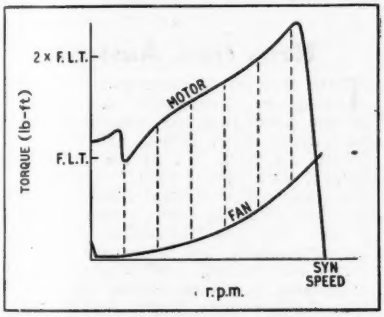


Fig. 1.—Typical torque-speed curves of squirrel cage motor and fan

employed, as a star-delta or auto-transformer started motor driving, say, a heavy inertia fan may take an inordinate time to run the fan up to speed. A long starting time will necessitate the provision of special time lags in the starter, apart from the fact that it may cause undue heating in the motor itself.

If W = weight in lb; K = radius of gyration in ft; T = available torque in lb/ft; V = velocity in ft/sec; and N = r.p.m.; an accurate method of determining the accelerating period is by calculating :—

$$\text{Time in sec} = \frac{WK^2\,0.00326\,N}{T}.$$

The available torque (T) is the average torque ordinate of the shaded portion of Fig. 1.

The foregoing simplified formula may be derived as follows :—

$$\text{Kinetic energy of rotating parts} = \frac{WV^2}{2g} \text{ ft-lb}$$

$$\text{Velocity (V) at radius of gyration} = \frac{K\,2\pi\,N}{60} \text{ ft/sec.}$$

$$\text{Kinetic energy} = \frac{W\left(\frac{K\,2\pi\,N}{60}\right)^2}{2g} \text{ ft-lb}$$

$$\text{Average effective h.p. available for acceleration} = \frac{N\,T}{2 \times \frac{33{,}000}{2\pi}}$$

$$\text{Acceleration in sec.} = \frac{\text{Kinetic energy}}{\text{Av. effective h.p.} \times \frac{33{,}000}{60}}$$

$$= \frac{\frac{WK^2\left(\frac{2\pi\,N}{60}\right)^2}{64.4}}{\frac{NT}{2 \times \frac{33{,}000}{2\pi} \times \frac{33{,}000}{60}}} = \frac{WK^2\left(\frac{2\pi}{60}\right)^2 N^2\,60}{\frac{64.4}{NT\pi}}$$

$$= \frac{WK^2\,0.00326\,N}{T}.$$

It is reasonably accurate to use this formula and calculate the accelerating time in one step, provided that the two curves (Fig. 1) do not come close together as in Fig. 2. Here there is obviously very little available torque as the motor approaches the maximum speed to which it can accelerate in the star position and the calculation of accelerating time when made from standstill to full or maximum speed is hardly accurate enough, as with this method the average ordinate over the whole is taken. This does not allow for the relatively long period of time required to accelerate through the portion where the two curves are close together.

* Design Dept. Lancashire Dynamo and Crypto, Ltd.

With a portion like this the calculation should be made in sections (say 10). If a six-pole 50 c/s motor with a synchronous speed of 1,000 r.p.m. is to be directly coupled to the fan, the accelerating time can be calculated from, say, 0 to 100 r.p.m., from 100 to 200 r.p.m., 200 to 300 r.p.m., etc., and these times added arithmetically to obtain the total time.

This procedure is rather laborious and can be simplified. The accelerating time is inversely proportional to the available torque; therefore, if we wish to relate the available torque directly to time, we invert it. Each ordinate is measured in the usual way, inverted, and the average found. The accelerating time can then be calculated in one step (from standstill to full or maximum speed) thus:—

Time in seconds =

$$WK^2 \ 0.00326 \ N \times \begin{pmatrix}\text{average inverted} \\ \text{torque ordinate}\end{pmatrix}.$$

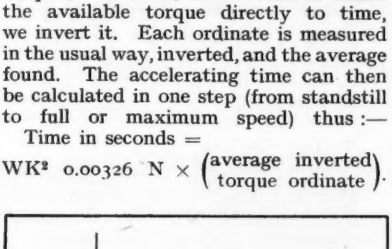


Fig. 2.—Typical torqe-speed curves; motor connected star (star-delta starting)

This is the best method because it is accurate for all conditions and gives a result very similar to the somewhat tedious method of calculating in sections.

Finally, in dealing with the application of the calculation, it will be appreciated that it can be used for any rotating machinery possessing inertia, such as pumps, flywheels, discs, as well as fans.

Induced and forced draught fans for a power station often require an induction motor of over 500 b.h.p. and such fans invariably possess heavy inertia (sometimes as high as 20 to 30 times the inertia of the rotor of the induction motor) so careful calculation of the accelerating time must be made. These fans are sometimes driven by two-speed motors and then accelerated in two steps from rest to low speed, then (when the full power of the fan is required) from low speed to high speed, the calculation being made as outlined but in two parts.

High-speed gas boosters also can easily be a source of trouble. Apart from the fact that they may possess large inertia, the final speed to which they have to be accelerated is usually the 50 c/s two-pole speed (3,000 r.p.m. syn.). Some motor manufacturers have been known to turn down enquiries for this type of equipment when star-delta starting has been specified, due to the inordinate length of time required for acceleration, involving its attendant heat dissipation problems.

The calculation of the temperature rise of the windings during the accelerating period is, however, outside the scope of this article.

News from Australia

THE Federal Minister for Works (Mr. Lemmon) announces that the first electric power from the new Snowy Mountains hydro-electric scheme will be available within ten years "or at the end of nine years if work goes to plan." He adds that the power will then total 240,000 kW, and in the following two years a further 160,000 kW should be added. Substantial increases would then take place every two years, with a final total of 1,720,000 kW or greater in twenty years. It is stated that the Tennessee Valley Authority may be asked by the Federal Government to lend engineers and electricians to assist in this huge £180,000,000 scheme which will eventually provide power for both New South Wales and Victoria.

The Premier of Victoria (Mr. Hollway) says that his Government is planning the completion, within the next ten years, of extensions to the existing generating capacity of the State Electricity Commission to provide approximately 1,000,000 kW to keep ahead of constantly increasing demands. The Government intends to spend £20,000,000 at Morwell on the new open cut and two briquetting factories to make Victoria independent of outside fuel supplies. The Kiewa electricity plant is being enlarged from 117,000 kW to 289,000 kW capacity; this, the biggest hydro-electric scheme now in progress, will cost more than £25,000,000.

A.C. Watt-Meters

Some Remarks on Creep and its Elimination

By H. E. ANGOLD, A.M.I.E.E.

CREEP in an a.c. watt-hour meter is due to the potential flux bias usually given to a meter to correct a natural falling off of speed at light loads. This bias creates a constant torque which is added to that of the meter at all loads. It therefore represents a much smaller proportion of the total torque at high loads than at low loads. Below 1/20 load its effect is increasingly felt; at no load it is still operative and may be sufficiently strong to cause continuous rotation of the disc. Hence the necessity for some device to prevent this tendency.

Supposing the full-load torque of a meter to be 5 gramme-centimetres. The torque at 1/20 load should be 0.25 gr-cm to obtain proportional speed. The light load, however, may be 4 per cent slow due mainly to the B-H curve of the iron, where the magnetization falls away for very low values of H. In this case the actual torque is 0.24 gr-cm so that a forward bias of 0.01 gr-cm must be added to bring the torque to 0.25 gr-cm, but 0.01 added to 5.0 (full load) is only 0.2 per cent, whereas 0.01 added to 0.05 (1/100 load) is 20 per cent. At no load there is still a torque of 0.01 gr-cm.

Normal Method

In order to prevent this no-load torque from causing continuous rotation of the disc, it is necessary to provide a resistance to this torque, at at least one point on the rotor, so adjusted that 0.01 gr-cm will not overcome it, but that it will be overcome and passed when the torque reaches 0.025 gr-cm, representing 1/200 load. The form that this resistance takes is known as the anti-creep device.

In most meters, it consists of two holes in the disc situated at diametrically opposed points. As either of the holes passes under the driving poles of the electromagnet, the path for the eddy currents is restricted, thus reducing the torque. The holes must be large enough to prevent rotation up to 10 per cent above the nominal voltage to conform with B.S.I. requirements.

The Continental method is to provide on the rotor spindle a piece of magnetic material which is attracted to a fixed piece of magnetic material energized by the potential flux and must satisfy the same conditions.

Arrangement Without Anti-Creep Device

If the meter is arranged so that the series pole pieces are always working on a straight part of the B-H curve by being constantly magnetized from the potential coil, the application of the series current will vary only the direction of the flux, not its magnitude, except to a small degree. This means that the driving torque will be exactly proportional from full load to very low loads so that no potential bias is needed to correct the light load speed. At no load, therefore, there is no torque and no creep, so that an anti-creep device is not required.

When the light load adjustment is left so that the 1/20 load is fast or slow compared with full load, the small tendency to creep will be stopped by the small electrical unbalance in the disc itself. The conductance of aluminium sheet is not perfectly uniform in every direction in the plane of the metal, so that the characteristic of the disc itself causes it to act as an anti-creep device. It is of sufficient magnitude to look after variations in the light load adjustment and, furthermore, this characteristic will impart a slight movement in *both* directions under no load conditions, according to the position of the disc. A large increase in voltage can only accentuate both movements. It is, therefore, impossible to obtain a continuous movement in one direction, whatever voltage is applied.

Gateshead Lighting Plans

THE Ministry of Transport has given an assurance that everything possible will be done to expedite the approval of plans for the second section of the electrification of street lighting at Gateshead, which will cost £17,700.

Electrical Farmers

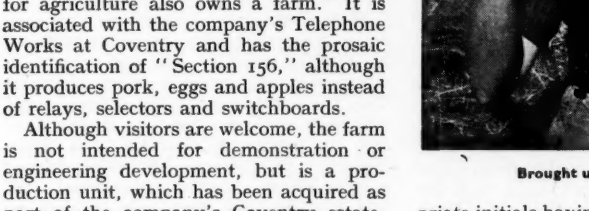
USEFUL G.E.C. SIDELINE

THE relationship between electricity and agriculture is continually becoming more close and any development which enables one industry to acquire a more intimate knowledge of the other is of great value. For this reason, we were interested to discover that the General Electric Co., Ltd., which has for many years played a leading part in the development of electrical equipment for agriculture also owns a farm. It is associated with the company's Telephone Works at Coventry and has the prosaic identification of "Section 156," although it produces pork, eggs and apples instead of relays, selectors and switchboards.

Although visitors are welcome, the farm is not intended for demonstration or engineering development, but is a production unit, which has been acquired as part of the company's Coventry estate. It is used to provide food for the Telephone Works Group canteens and the associated Copsewood Grange Club. Together with the farm is a market garden; the total area is 30 acres and full-time employment is given to five people.

Brought up on the bottle

A start has been made to build up a herd of attested and accredited pedigree Jerseys, registered with the English Jersey Cattle Society and earmarked "G.E.L.," the more familiar and appropriate initials having already been allotted to another herd. The milk is handled in an up-to-date all-electric dairy equipped for electric sterilizing and water heating.



All-electric dairy at Copsewood Farm

Another activity is the raising of pigs, of which there are at present 33. Poultry, ducks and geese are kept, also about 50 pedigree rabbits of several varieties. The rabbits provide a welcome addition to company menus, and the pelts are cured and sold to G.E.C. employees.

The market gardening section of Copsewood Farm produces a wide range of vegetables, hard fruits, soft fruits (including peaches and grapes), as well as bedding plants and tomatoes for sale to employees.

The farm is run as an economic unit and has to pay its way. Its equipment is such as would be used on any commercial farm and it is anticipated that the valuable experience obtained will be put to practical use for the benefit of farmers.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Brush Electrical Engineering Co. Scholarship, awarded annually to one of the engineering student apprentices, has this year been won by **Mr. G. M. Bayley.** The value of the scholarship is £150 per annum tenable at Nottingham University in the Faculty of Engineering. Mr. Bayley joined the Brush Co. in January, 1948, from Oundle School. In view of the high standard of this year's candidates a special scholarship of £75 per annum has been awarded to **Mr. J. R. French.** This is also tenable at Nottingham University. Mr. French was educated at High Pavement School, Nottingham, before joining the Brush Co. last September.

Mr. A. E. Marson, M.B.E., an assistant secretary in the Electricity Division of the Ministry of Fuel and Power, is retiring at the end of this month. Mr. Marson was educated at King Edward VI Grammar School, Stafford, and entered the Civil Service in 1908. After serving in various departments in the Board of Trade he was transferred to the Electricity Commission on its formation in 1919 and became assistant secretary in 1942, being appointed secretary in 1945 on the retirement of Mr. R. T. G. French. Mr. Marson acted as secretary to the McGowan Committee on Electricity Distribution in 1936-37, and was awarded the M.B.E. in 1937. In the 1914-18 war he held a commission in the South Staffordshire Regiment, serving in Gallipoli, where he was wounded, and later in France.

Colonel J. G. Crabbe, O.B.E., M.C., J.P., of Duncow, Dumfries, who is a member of the South West Scotland Electricity Board, has been appointed Lord Lieutenant for the County of Dumfries in succession to the late Sir Hugh S. Gladstone, of Capenoch. Col. Crabbe has been a member of Dumfries County Council since 1927 and Convener of the County since 1945.

Mr. A. J. Beanland, B.Sc.Tech., A.M.I.E.E., A.M.I.P.E., who was branch manager at the Leeds office of Lancashire Dynamo & Crypto, Ltd., has been seconded by the board for duties at the Cardiff factory. Mr. Beanland joined the company in 1932 and was appointed assistant engineer at the Leeds office in 1936; he became district manager in 1945. **Mr. N. S. Goddard,** A.M.I.E.E., previously assistant to Mr. Beanland, has now been appointed Leeds manager. Mr. Goddard joined the company in 1932, and upon release from Naval service in 1946, returned to the company and was appointed to Leeds in 1947. **Mr. J. K. Swain,** A.M.I.E.E., has been appointed as assistant to Mr. Goddard at the Leeds office. He joined the company in 1935 and returned to the company after service in India during the war.

Mr. E. Garlick, A.M.I.Mech.E., M.I.P.E., has relinquished his position as works and production manager with A. C. Wickman, Ltd. (Wimet Division), Coventry, on being appointed to the board of Rudkin & Riley, Ltd., die manufacturing plant specialists and electrical engineers, of Aylestone, Leicester.

Mr. E. Garlick

On Saturday mornings the management of the Witton Works of the **General Electric Co., Ltd.,** is "at home" to members of employees' families, and factory managers and foremen are giving up their leisure time to meet visitors and conduct them round the works. Separate visits are being arranged to different parts of the works, and already several have taken place and have proved very popular.

The Herbert Akroyd Stuart Award, value £50, offered biennially by the Institute of Marine Engineers under the will of the late Herbert Akroyd Stuart for the best paper on the development of the heavy oil engine, has been awarded to **Mr. J. Lamb,** O.B.E., M.I.Mar.E., for his paper entitled "Burning of Boiler Fuel in Diesel Engines."

Mr. G. H. Gunson, C.A., and **Col. R. B. Emerson,** C.I.E., O.B.E., M.Inst.T., have been appointed to the board of Dowsett Holdings, Ltd., as from 8th July.

Mr. W. L. Wray has been appointed general manager of Wandleside Cable Works, Ltd. Mr. Wray received his commercial education at the Manchester High School of Commerce and his technical education at the Manchester College of Technology. After early training and experience with W. T. Glover & Co., Ltd., from 1929 to 1936, he joined Crompton, Parkinson, Ltd. (Derby Cables, Ltd.) where, until 1944, he was manager of the rubber cable factory, being subsequently promoted chief planning engineer and production manager. In January, 1945, he was appointed rubber cable works manager of Scottish Cables, Ltd. At the beginning of this year he joined Wandleside Cable Works, Ltd., as works manager,

and following the death, at the end of last April, of the late managing director, Mr. A. Feld, he has been promoted to general manager.

Mr. H. Manley Roberts, M.I.E.E., who has for the past three years been chief electrical engineer to the Ministry of Supply's Division of Atomic Energy (Production), is retiring from active control in August. He will, however, continue to act in an advisory capacity.

Mr. W. Hunt, M.B.E., works manager of Ferranti, Ltd., has been appointed a magistrate. For ten years he was a member of the Failsworth District Council, of which he was chairman in 1941.

Mr. E. J. Ferguson, who has been connected with the electrical industry for nearly twenty-five years, has recently joined the staff of Young & Wildsmith, Ltd., and has been appointed manager of their branch at 41, York Road, Ilford, Essex.

Mr. A. Hastie, M.Inst.T., has been elected a member of the Council of the Institute of Transport, with effect from 1st October next. Mr. Hastie holds the position of transport officer to the British Electricity Authority.

On 14th July, the directors of **British Insulated Callender's Cables, Ltd.,** invited the staff of their Erith factory to a dinner and dance at the Paramount Salon de Danse,

Sir Alexander Roger speaking at the B.I Callender's Erith staff dinner.

Tottenham Court Road, W.1. Mr. W. G. Hendrey took the chair at the dinner and, after the loyal toast, proposed "The Company." To this, Mr. E. J. O'Connor, chairman of the staff association at Erith works, responded. He was followed by the chairman of the company, Sir Alexander Roger, who touched briefly upon future trends in industry. Later, Mr. J. L. Packer, works manager at Erith, addressed the gathering. Among several novelties introduced to enliven the dance was a competition in the form of a miniature cycle race which caused considerable hilarity.

Mr. F. H. Bellamy, who for many years was manager of the Heavy Duty Department, and later sales manager, of the Jackson Electric Stove Co., Ltd., will be leaving their service on 31st July. Mr. Bellamy represented the company on committees of B.E.A.M.A. (Domestic Electrical Appliances and Cooker Sections), and the Catering Equipment Manufacturers' Association.

Mr. C. L. Hill is reducing his business activities on medical advice, and has resigned from the board of the Brush Electrical Engineering Co., Ltd.

The annual summer outing of the **British Central Electrical Co., Ltd.** took place on 16th July. As in 1948, Brighton was selected, and a pleasant day was spent indulging in the various attractions of that resort.

E. K. Cole, Ltd., have recently appointed **Mr. E. R. Barnett** to advise Ekco dealers in the new Midlands television area on demonstrations, sales promotion and after sales service of receivers. Mr. Barnett can be communicated with at the Ekco Service Depot, 11, Brook Street, Birmingham, 3, or at the head office, Southend-on-Sea.

C. A. Parsons & Co., Ltd., announce the appointment of **Mr. H. P. Martin** (general sales manager) and **Mr. W. D. Horsley** (chief electrical engineer) as directors of the company as from 20th July.

Mr. Martin served his apprenticeship with the company and has been in their service for twenty-five years. In 1932 he was appointed assistant representative in Canada, and after two years in that country was appointed resident engineer in India. He held this position for five years, being recalled to Heaton Works in 1939 to take up the duties of general sales manager.

Mr. Horsley also served his apprenticeship at Heaton Works where he started in 1913. He has travelled extensively in the interests of the company and was appointed chief electrical engineer in 1938. He is a member of the Institution of Electrical Engineers and was chairman of the North Eastern Centre in 1937. Mr. Horsley is the author of many technical papers and has contributed a number of articles dealing with important developments in electrical generating plant to the technical press. He has been awarded on two occasions the John Hopkinson Premium by the I.E.E. for papers read in 1935 and 1940.

Mr. H. Ainsworth A.M.I.E.E., the commercial officer of the Harrogate

Sub-Area of the North-Eastern Electricity Board, has been appointed commercial officer of the Board's Wear Sub-Area. Mr. Ainsworth was an articled pupil at the Blackburn electricity undertaking, and subsequently served with the Newport (Mon.) and Plymouth electricity undertakings before going to Harrogate in 1945 as consumers' engineer, which position he held at vesting date.

For the first time since 1939 the annual staff outing of **Courtney, Pope (Electrical), Ltd.**, was revived on 23rd July when the Social and Sports Committee organized a trip to Cliftonville and the party assembled at the works at 8 a.m. joining a party from Courtney, Pope, Ltd. They reached Cliftonville in time for lunch at the Grand Hotel. Care had been taken to trace wherever possible, retired members of the staff, and a number of these were able to be present. The splendid weather and the usual amenities of Cliftonville were enjoyed to the full during the rest of the day. All the directors were present.

Obituary

Mr. W. Kenyon.—The funeral took place on 18th July of Mr. William Kenyon, of Standish, near Wigan, Lancs., aged 83, who until his retirement twenty years ago, was chief electrical engineer to the Wigan Coal and Iron Co.

Mr. J. H. Runbaken.—The death occurred suddenly on 18th July of Mr. J. H. Runbaken, managing director of Runbaken Electrical Products, Manchester, which he founded over forty years ago.

Mr. T. A. Sedgwick, who was chief electrical engineer of Vickers-Armstrongs, Ltd., for thirty-three years until his retirement in June, 1946, died on 20th July.

Mr. John David Gibson, North-West area representative of the International Marine Radio Co., Ltd., died suddenly in Liverpool on 18th July, aged forty-three years. Mr. Gibson joined the company in 1933, and for the last ten years he had been in charge of the Liverpool depot.

Wills

Mr. H. E. Hadley, B.Sc., A.R.C.S., F.C.S., formerly for many years principal of Kidderminster and District School of Science, and author of a number of text books on magnetism and electricity, who died on 6th March last, left £2,184 gross (£1,734 net).

Mr. F. W. Langley, founder and chairman of the Lancing Electrical Manufacturing Co., Ltd., Worthing, left £5,771 gross (£5,509 net).

New Research Council

Appointment by B.E.A.

THE British Electricity Authority has decided to set up an Electricity Supply Research Council, the chairmanship of which has been accepted by Sir Harold Hartley, chairman of the British National Committee and International Executive Council of the World Power Conference and a former chairman of the Fuel Research Board. Other members who have accepted invitations to serve are Sir Edward Appleton, Principal and Vice Chancellor of Edinburgh University; Professor F. E. Simon, Professor of Thermodynamics, Oxford University; Sir David Brunt, Professor of Meteorology, Imperial College, South Kensington; Professor H. W. Melville, Professor of Chemistry, Birmingham University; Sir Geoffrey Taylor, Yarrow Research Professor of the Royal Society; Mr. V. A. Pask, chief engineer, B.E.A., and Mr. C. W. Marshall, deputy chief engineer (research), B.E.A. Additional nominations will be made to represent the Electricity Boards.

Terms of Reference

The terms of reference of the Council are: "To advise the Central Authority and Area Boards on specific problems relating to electricity supply; to keep under review matters affecting the supply of electricity and to advise the Central Authority and Area Boards on programmes and planning of research carried out over the whole field; and to make recommendations to the Central Authority on research which the Council considers it desirable to initiate."

The need for the establishment of a Research Council has been under consideration by the Authority for some time and the decision now announced follows consultations with the Area Boards and a comprehensive review of the scope of the research activities which the Authority is called upon to undertake under Section 2 of the Electricity Act, 1947. Its composition indicates the importance which the Authority attaches to securing a body of scientific advisers of wide experience and knowledge to advise it in the research problems of the electricity supply industry and to focus general scientific research and development in their implications for the particular field of research in electricity supply. The activities of the new Council, which will act in a purely advisory capacity, will lie within the field of the B.E.A. and the Area Boards and will be complementary to those entrusted to the various advisory bodies appointed by the Government.

Machinery and Plant

Wear and Tear Allowances

By JOHN LYMESTER

THE initial allowance for wear and tear of machinery and plant has been increased from 20 per cent to 40 per cent in respect of equipment purchased on or after 6th April, 1949. The initial allowance is granted in the income-tax year in the basis financial year in which the expenditure is incurred. Therefore, as 6th April, 1949, for the normal continuing businesses, falls in the income-tax year 1950/51, that is the first year for which the increased initial allowances will arise. Machinery and plant includes, beside the normal items classified as such, fixtures and fittings of a durable nature, motor cars, etc., and is granted both for new and second-hand machinery and plant purchased.

Wear and tear allowances are calculated as follows:—

(1) A percentage deduction of the cost or written-down value. The written-down value, of course, is the original cost less all allowances granted. The Finance Act, 1949, also provides the method of computing the written-down value, as there has been some doubt in the past as to the basis of calculation.

(2) An addition of one-quarter to the amount calculated in (1).

(3) An initial allowance, which before 6th April, 1949, was 20 per cent of the cost. Initial allowances have been granted in respect of machinery and plant purchased on and after 6th April, 1946, and also in respect of machinery and plant purchased on and after 6th April, 1944, provided such machinery and plant was in use on 6th April, 1946, and the income-tax value as at 6th April, 1946, was taken for the purpose of calculating the allowance.

(4) A balancing allowance if the machinery and plant is sold, scrapped or destroyed, and there is an income-tax loss. Conversely, however, if the machinery and plant is sold at a profit, this is assessed to income tax by means of a balancing charge. The balancing allowances, balancing charges and initial allowances are allowed or raised in the income-tax year in the basis financial year in which the event takes place.

It is the intention to provide that the whole loss on machinery and plant is allowed during the period of its use, and this loss is the maximum obtainable. Thus, the result of the increased allowance is merely to grant increased deductions earlier, but ultimately the allowances only equal the losses which are incurred. For example, if machinery and plant of a value of £1,000 was purchased in the year ended 31st December, 1946, income-tax allowances will be granted as follows:—

1947/48	
Wear and tear at, say, 10 per cent equals	£100
Plus an additional one-fourth equals ..	£25
Plus initial allowance of 20 per cent equals	£200
Total allowance ..	£325
1948/49	
Written-down value is £675, and the 10 per cent, plus the additional one-fourth, amounts to	£85

If in the financial year ended 31st December, 1948, the machinery and plant was sold for £400 in the income-tax year, 1949-50, a balancing allowance of £190 will be granted, that being the difference between the written-down value of £590 and the sale price. Thus a loss of £600 has been incurred on the machinery and plant which has been covered by allowances of £325, £85 and £190.

The increased initial allowances merely bring forward the granting of the allowances; they will assist industry and commerce to re-equip, but will only go partially towards meeting the expenditure.

It should be noted that the Chancellor of the Exchequer has appointed a committee to inquire into the methods of computing profits and the method of assessment, and as a result of this inquiry certain benefits may arise.

Overseas Electrical Trade

SECOND HIGHEST MONTHLY EXPORTS IN JUNE

WITH a total of £11,034,248 exports of electrical goods and machinery in June were £752,893 above the May figure and no less than £2,105,987 more than in June last year; they are only £383,204 below January's record total of £11,417,452. Compared with May, approximately equal numbers of individual items showed increases and decreases, the higher total being attributable largely to substantially improved trade in submarine cables, lamps and lighting equipment, certain types of accumulators, instruments, insulating cloth, generators up to 200 kW, motors over 250 h.p., switchgear and switchboards.

South Africa (£164,599) and Australia (£109,675) accounted for a large proportion of the telegraph and telephone wires and cables (not submarine), while India and South Africa took most of the rubber insulated cable (£134,181 and £125,914 respectively) and also cables with insulation other than rubber (£237,864 and £206,268).

Of the £262,029 worth of domestic radio apparatus £61,885 went to South Africa and £40,156 to India. The biggest buyer of telegraph and telephone and signalling apparatus was Australia (£297,575), followed by South Africa (£239,150) and New Zealand (£172,225). South Africa was the best customer for lamps and lighting equipment (£192,987), accumulators (£118,993), and cooking and heating apparatus (£111,753). Of electrical goods and apparatus exports as a whole totalling £6,917,491, South Africa was easily the biggest buyer, taking £1,567,908, followed by India (£993,292) and Australia (£681,998); the best non-Empire customers were Egypt (£180,280), the Netherlands (£176,705), the Irish Republic (£167,729) and Sweden (£140,171).

TABLE I.—ELECTRICAL EXPORTS

Class	June, 1949	June, 1948
	£	£
Telegraph and telephone wires and cables (submarine) ...	118,956	5,876
Ditto, not submarine	558,886	766,794
Wires and cables, rubber insulated	484,661	504,505
Ditto, cotton, silk or artificial silk insulated	89,066	73,330
Ditto, enamel, glass or asbestos insulated	103,757	37,812
Ditto, paper insulated ...	800 116	732,894
Ditto, other	98,073	99,614
Commercial radio apparatus ...	256,217	221,710
Domestic radio apparatus ...	262,029	349,935
Telegraph, telephone and signalling apparatus	1,285,507	1,071,248
Radio loudspeakers	24,730	19,447
Sound reproducing apparatus components and parts, other than cinematograph apparatus	286,185	257,763
Other radio, etc., apparatus ...	71,715	62,428
Radio valves	162,330	200,939
Electric lighting carbons ...	7,536	16,375
Lamps, not exceeding 24 V	32,097	17,594
Discharge lamps	31,292	27,843
Other lamps	107,743	107,025
Other lighting apparatus ...	470,354	425,085
Primary batteries	48,125	58,936
Accumulators for motor vehicles	148,311	141,442
Ditto, traction	24,223	13,081
Ditto, radio	1,675	3,355
Other portable accumulators	86,521	54,451
All other accumulators ...	25,321	42,584
Parts and accessories	86,742	47,970
Cooking appliances	130,233	167,043
Heating appliances	52,947	76,957
Parts and accessories of cooking and heating appliances ...	46,238	38,411
Flat irons	45,091	32,253
Commercial electrical instruments	99,358	70,555
House service meters	116,398	185,041
Time recorders and time switches	4,405	9,172
Other electrical instruments ...	65,763	81,334
Electro-medical apparatus (not X-ray)	35,990	28,021
X-ray apparatus, tubes and parts	47,737	39,591
Permanent magnets	12,552	16,734
Insulating cloth and tape ...	84,404	55,855
Other insulating materials ...	96,456	81,411
Unclassified goods and apparatus	412,751	345,746
Generators, up to 200 kW ...	992,459	237,984
Ditto, over 200 kW	156,532	69,451
Ditto, parts	108,615	194,329
Motors, railway and tramway	91,921	28,440
Ditto, other, up to ¼ h.p. ...	93,093	85,719
Ditto, from ¼ to 1 h.p. ...	53,616	54,636
Ditto, from 1 to 250 h.p. ...	511,901	321,933
Ditto, over 250 h.p.	104,307	20,861
Ditto, parts	88,963	50,075
Converting machinery ...	9,934	2,196
Transformers, including coils	489,880	296,584
Rectifiers for power house use...	20,228	12,217
Motor starting and control gear	166,188	145,330
Switchgear and switchboards (not telegraph or telephone) ...	896,417	540,898
Other electrical machinery ...	22,561	32,516
Vacuum cleaners and parts ...	174,062	205,142
Other electrically operated portable appliances	136,080	42,241
TOTAL	11,034,248	8,928,261

Russia accounted for £682,365 of the £1,257,606 worth of generating plant exported, South Africa and India taking most of the motors (£193,111 and £153,151 respectively) and other machinery (£388,327 and £287,539 respectively).

For the first six months of the year electrical exports totalled £62,985,136, which compares with £49,013,936 in the first half of 1948. Exports of electrical goods and apparatus amounted to £40,847,373 compared with £34,612,915, while shipments of generators rose from £3,629,644 to £6,447,594, and those of motors from £3,298,503 to £5,350,147. Exports of other electrical machinery amounted to £8,594,138 (£6,271,133).

South Africa was the largest purchaser of electrical goods and apparatus with £6,469,297, followed by India (£5,815,596), Australia (£4,384,240), New Zealand (£1,981,758), the Irish Republic (£1,270,721), Egypt (£1,214,135) and Malaya (£1,203,319). Russia took £2,608,829 worth of generators and India £1,000,092 worth of motors. South Africa (£1,633,172) and India (£1,604,901) bought almost equal amounts of other electrical machinery.

Imports of electrical apparatus and machinery in June at £276,557 were £91,681 below those for May and £31,684 lower than for June last year. The United States supplied £72,848, the Netherlands £49,538 and Canada £37,374 of the £223,675 worth of electrical goods and apparatus. The January-June figures totalled £1,762,157, a drop of £463,763 compared with the first six months of 1948. The principal items were furnace carbons (£196,589) and radio communication and navigational equipment (£171,002). The United States was the largest supplier of electrical goods and apparatus, sending £423,735 worth.

TABLE II.—DISTRIBUTION OF ELECTRICAL GOODS AND APPARATUS

Destination	June, 1949	June, 1948
	£	£
Channel Islands	34,896	30,520
Malta and Gozo	8,557	23,591
Cyprus	5,744	15,272
British West Africa	114,034	74,909
Union of South Africa	1,567,908	924,038
Northern Rhodesia	19,387	13,531
Southern Rhodesia	127,079	67,439
British East Africa	104,921	114,652
Bahrein, Koweit, Qatar and Trucial Oman...	49,417	11,725
India	993,292	539,541
Pakistan	34,432	107,805
Malaya	157,235	152,673
Ceylon	46,636	54,630
Hong Kong	173,197	98,517
Australia	681,998	618,843
New Zealand	387,932	286,350
Canada	103,289	87,261
British West Indies	127,817	56,022
Anglo-Egyptian Sudan ...	20,899	28,685
Other British Countries ...	72,602	60,087
Irish Republic	167,729	225,139
Soviet Union	68,438	1,834
Finland	82,182	57,243
Sweden	140,171	516 472
Norway	102,161	170,182
Iceland	9,123	5,226
Denmark...	86,124	93,636
Poland	38,334	12,119
Germany	8,842	11,984
Netherlands	176,705	107,971
Belgium	71,123	97,330
France	65,627	52,556
Switzerland	16,922	26,407
Portugal	29,960	158,551
Spain	19,320	58,775
Austria	11,317	11,967
Hungary	15,585	8,728
Czechoslovakia	9,114	24,582
Yugoslavia	9,438	16,002
Greece	44,351	38,308
Turkey	20,797	199,486
Dutch East Indies	40,881	19,180
Dutch West Indies	8,726	11,736
Portuguese East India ...	7,817	28,514
Syria	13,025	8,437
Lebanon	9,179	16,531
Palestine	19,067	10,952
Egypt	180,280	264,604
Iraq	79,863	130,343
Iran	97,821	164,767
Burma	33,098	97,649
China	1,711	12,660
United States of America ...	9,488	4,453
Mexico	12,152	2,269
Colombia...	5,488	22,054
Venezuela	62,094	70,949
Chile	2,508	10,888
Brazil	32,053	142,820
Uruguay	23,425	23,289
Argentine Republic	87,628	200,197
Other Foreign Countries ...	166,552	84,829
TOTAL	6,917,491	6,587,710

C.I.G.R.E. Arrangements

THE thirteenth Conference Internationale des Grands Réseaux Electrique (C.I.G.R.E.) will be held in Paris from 29th June to 8th July, 1950. The opening ceremony will take place on the morning of the first day and the technical discussions will commence in the afternoon, in the following order: Section 3, on the operation, protection and interconnection of power networks; Section 4, on subjects of general interest; Section 1, on generation, transformation and circuit breaking; and Section 2, on the construction, insulation and maintenance of overhead lines and underground cables. Detailed programmes will be sent to permanent members in due course. Further particulars are obtainable from the secretary, British National Committee, C.I.G.R.E., Thorncroft Manor, Dorking Road, Leatherhead, Surrey.

COMMERCE and INDUSTRY

Next Year's B.I.F. : Large Overseas Contracts

APPLICATIONS have already been received by the organizers of the British Industries Fair for more than half the total space available at Earls Court and Olympia in London. In Birmingham, where a similar proportion has been received by the Chamber of Commerce, extensions are being made to the outdoor section. The next Fair will be held at both centres from the 8th to 19th May, 1950.

Contract Price Adjustment Formulæ

The following are the latest figures for use in the B.E.A.M.A. contract price adjustment formulæ: The rate of pay for adult male labour at 9th July is deemed to be 115s (unchanged). Cost of materials: the Board of Trade index figure for intermediate products at 9th July is 257.9, and is the figure for June (against 259.7 for May).

Sturtevant Jubilee

On 24th July the Sturtevant Engineering Co., Ltd., completed its fiftieth year of incorporation as a limited company. A range of fans was first developed by Mr. B. F. Sturtevant, of Boston, U.S.A., in the 1870's. The data compiled by Mr. Sturtevant was made available in this country to Mr. G. A. Mower, who in 1884 founded the Sturtevant Co. and started a new British industry. For many years Mr. Mower purchased his fans from the Boston works of Mr. Sturtevant, and consequently he named his firm the Sturtevant Engineering Co., which was later converted into a limited company. To mark the jubilee of its incorporation, the company has produced a new general catalogue describing its products, including its fans, air-conditioning heating and ventilating equipment, air washing and filtering plant, dryers and drying systems and electrostatic precipitation. The catalogue is excellent produced with numerous illustrations (many in colour) showing the applications of the company's products and some of the power stations and industrial plants in which they have been installed.

Croydon Industrial Exhibition

There was a representative display of electrical apparatus at the recent Croydon Manufacturing and Industrial Exhibition in which the South Eastern Division of the B.E.A., the South Eastern Electricity Board and local electrical contractors took part. The South Eastern Division displayed a complete model of the new Croydon "B" station, while the S.E. Board showed sectional underground joints working models of three types of meters, as well as normal showroom apparatus. The local electrical contractors combined to display sectional switchgear and domestic electrical apparatus. All the electrical work and lighting effects in connection with the exhibition were carried out by the S.E. Board and the Croydon Circle of electrical contractors. In

The S.E.E.B. Croydon building floodlit during the local industrial exhibition

the accompanying picture we show the entrance to the S.E.E.B. building which was floodlit during the exhibition by seventeen 150W sodium units, the installations being carried out by the Board's staff.

Leicester Company's Overseas Business

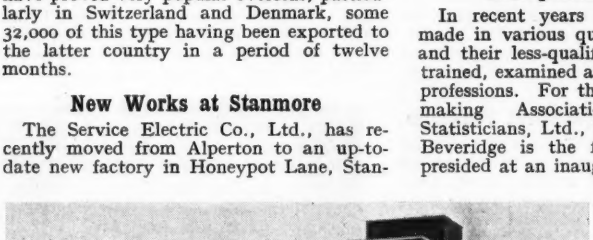
A considerable amount of both direct and indirect export business is now being done by Gent & Co., Ltd., Leicester. Business has been particularly good in electric clocks, mostly of the master clock controlled type, and recent orders cover apparatus for the Sidi-Gaber railway station, Cairo; Municipal Buildings, Oporto (incorporating also striking and chiming mechanism and bells, the largest being three tons); microphone-silent impulse clock systems for radio stations in India, Turkey and Singapore; Government Buildings at Ankara and

Colombo; public clocks for Municipal Buildings at Machachi, Ecuador; and marine-type controlled clock systems for ships being built at Trieste. Three complete sets of water-level equipment for New South Wales reservoirs have just been shipped.

The company's domestic bells of the underdome, and "All-in-one" battery types have proved very popular overseas, particularly in Switzerland and Denmark, some 32,000 of this type having been exported to the latter country in a period of twelve months.

New Works at Stanmore

The Service Electric Co., Ltd., has recently moved from Alperton to an up-to-date new factory in Honeypot Lane, Stanmore. Besides facilitating the electrical contracting and motor repair sides of the company's business, the improved accommodation will permit an expansion of production of "Secomak" electrical appliances, which now include industrial vacuum cleaners; chimney-sweeping equipment; blowers, including hot-air types; Wellington boot dryers for fire stations, etc; and sirens, including types with automatic sound-damping shutters for marine use. With the exception of the castings, all components of the company's products, including the motors, are made in the factory. About 40 per cent of production is for export.



New factory of the Service Electric Co., Ltd., in Honeypot Lane, Stanmore

New-Style Wrapper for Lamps, etc.

With the installation shortly of special new plant, Corrugated Wrappers (Hanwell), Ltd., Trumpers Way, Hanwell, London, W.7, will be in a position to supply a new type of corrugated wrapper of the open-ended box type, holding the article filmly and packing flat. It can be produced in any shape or size and in two colours. While it can be used for wrapping any type of small article it is especially suitable for lamps and fluorescent tubes and can be used with the same bulk packs.

The wrappers are cheaply produced because they are made in one operation as compared with three for the comparable types now supplied, the high-speed machines producing them at the rate of 750,000 a day.

Incorporated Statisticians

In recent years suggestions have been made in various quarters that statisticians and their less-qualified assistants might be trained, examined and organized as in other professions. For this purpose a non-profit-making Association of Incorporated Statisticians, Ltd., has been formed. Lord Beveridge is the first president, and he presided at an inaugural luncheon at which the guests included Mr. C. E. Beevers (Ministry of Education), Mr. Arthur Bottomley (Secretary for Overseas Trade), Sir William Coates, Sir Graham Cunningham, Mr. R. G. Glenday (Federation of British Industries), and Mr. J. G. Kydd (Registrar General, Scotland).

Mr. B. P. Dudding (General Electric Co., Ltd.) is vice-president and chairman of the Council. The registered offices of the Association are at 54, New Broad Street, London, E.C.2, and the hon. secretary is Mr. S. Harris.

Brush Overseas Orders

The Brush Electrical Engineering Co., Ltd., has received from its agents in Australia, Barlow & Retallack, orders for transformers to the value of approximately £225,000. For the Hydro-Electric Commission, Tasmania, the company is to supply nine 10 MVA single-phase transformers to form three 30 MVA 3-phase 110/11 kV star/delta banks with h.v. tappings controlled by "off-circuit" tapping switch and two 5,000 kVA transformers, 3-phase 110.88/22-11 kV star/star connected with delta tertiary winding with h.v. tappings controlled by "off-circuit" tapping switches. It is supplying for the new South Wales Government Railways four 10 MVA transformers, 3-phase, 66/11 kV, delta/star connected with h.v. tappings controlled by fully automatic "on-load" tap-changing equipment. The State Electricity Commission of Victoria has ordered 200 transformers from 25 kVA to 300 kVA, 3-phase,

6,600/415 V, and 22,000/415 V weather-proof pattern, delta/star connected with h.v. tappings controlled by "off-circuit" tapping switch.

Acting as sub-contractors to Vickers-Armstrong, the company has received an order to the value of over £350,000, for the main power station and all electrical equipment, including the main kiln motors, for the new United Provinces Government cement factory to be erected at Robertsganj, near Mirzapur. The plant for the power station will include three Brush Ljungstrom turbo-alternators, 2,400 kW m.c.r. at 3,300 V. They will operate on steam conditions of 325 lb/sq in and 725° F and will each be arranged on the unit principle with a 30,000 lb/hr John Thompson water-tube boiler, complete with superheaters, stokers, economizers, induced and forced-draught fans, and including water-treatment plant, feed pumps and coal and ash-handling plant.

Electricity for Mecca

It is reported that the Saudi-Arabian Government has authorized Gellaby, Hankey & Co., a British firm in Jeddah, to place orders for the provision of a public electricity supply in the Holy City of Mecca. The work has been entrusted to the Power and Traction Finance Co., the English Electric Co., Ltd., and British Insulated Callender's Construction Co. These companies have already undertaken the supply of electricity in the port of Jeddah; the new work will be an extension of this scheme.

Philips' Convention

Philips Electrical, Ltd., held their first post-war convention from 12th to 14th July, when nearly 200 delegates who included the company's representatives from all parts of the country gathered at the Palace Hotel, Buxton. One of the first things representatives saw when they arrived after dusk was the Palace Hotel floodlit with Philips sodium lamps, which were also used to considerable effect for lighting the trees in the hotel grounds. A full programme of business and social activities had been arranged. At the business sessions, talks were given by the commercial managers of all product groups. The social events included a motor-coach tour through the Derbyshire dales, a sports competition and a variety concert.

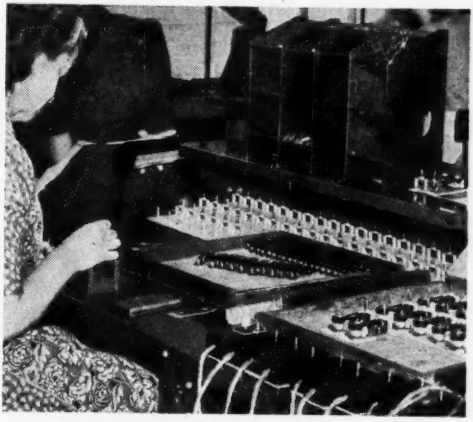
Large Contracts for C.A. Parsons

It was announced recently by the Chairman of the Hydro-Electric Power Commission of Ontario that an order had been placed for the second turbo-generator set for the Commission's steam plant in Toronto with C. A. Parsons & Co., Ltd., who secured the order for the first set. The generator will have a rating of 80,000 kW at 13,800 V, 60 cycles. Both sets are expected to be delivered by June, 1951.

Parsons have also received a £320,000 order for the manufacture, erection and maintenance of a second 40,000 kW set for a new power station at Tennyson, Queensland, Australia, for Brisbane City Council. The new station is planned to be completed in three years.

Special Thermostats

Apart from standard types of "Constat" thermostats for the control of space heaters, immersion heaters, irons, etc., Thermostatic Controls, Ltd., Avenue Road, Hampton, Mdx., are now making a large quantity of special instruments. Equipment is produced for various industrial and commercial applications, including the temperature control of all types of liquid, and there are special units available for use with such apparatus as electrically heated gluepots, vulcanizers, hotplates, fishfryers, sterilizers, etc. One novel application is the control of tropical fish tanks, the thermostat being fitted to the outside of the tank.



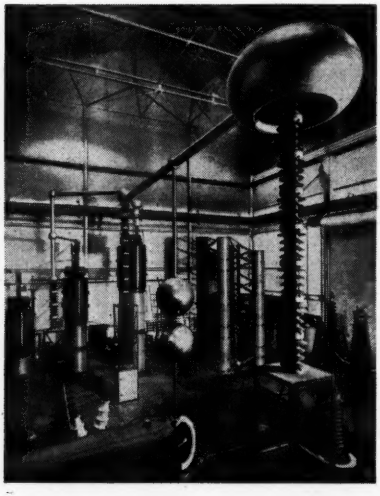
Assembling thermostats for tropical fish tanks

The operating mechanism of the thermostats is of conventional design employing a bimetallic strip. The heavy silver contacts are fitted with a patented arc damping device, ceramic and mica being used for the insulation. Temperature ranges between 30 deg F and 650 deg F are catered for,

with differential adjusted according to application (to within $\pm\frac{1}{2}$ deg F if necessary). Special care is taken in testing the instruments, immersion heater thermostats in particular being individually tested under actual working conditions. "Rubicon" immersion heaters are made by the associated company, Controlled Heating Units (London), Ltd.

H.V. Testing Laboratory

Since the war the $2\frac{1}{2}$-million volt testing laboratory at the Witton Works of the General Electric Co., Ltd., first commissioned in 1930, has been completely re-equipped and modernized, as shown in the accompanying illustration. In addition to providing the specialized information required for the design of very high voltage apparatus, all the company's equipment for use on high voltage system is tested in this laboratory.



$2\frac{1}{2}$-million volt testing laboratory at Witton

Industrial Radiography

In the description last week of protective equipment for handling radioactive sources in "Industrial Radiography," reference was made in error to radium sources of 100 or 250 and 15 or 30 micrograms. The milligramme (mgm) is the correct unit.

London Domestic Science School

The London School of Electrical Domestic Science, Ltd., of Imperial Court, Basil Street, Knightsbridge, S.W.3 (which was started by Miss H. M. M. Minoprio in 1934 for the purpose of training demonstrators for electricity supply authorities and was taken over by the Jackson Electric Stove Co., Ltd., in 1947) will be closing at the end of the year.

British Goods for Italy

The Anglo-Italian Joint Economic Committee held its fourth meeting in London from 4th to 15th July. The Committee reviewed the balance of payments and the course of trade between the two countries in the light of the programme agreed at meetings in Rome in February and May of this year, and they were able to agree on some further increases in both directions above the previously agreed programme. The Anglo-Italian Payments Agreement of 26th November, 1948, which had expired on 30th June was renewed until 31st December, 1949. The Italian Government has agreed to grant licences for United Kingdom manufactured goods substantially above the level agreed in February, 1949. The quotas now agreed will cover the period 1st January, 1949, to 30th June, 1950. The goods include special resistance wires and tapes, electronic equipment, and electro-medical apparatus.

Price Controls Removed

The Board of Trade has accepted the advice of the Central Price Regulation Committee that price control of certain goods is no longer necessary to safeguard the interests of the public, and has accordingly made Orders freeing a number of classes of goods from all price control from 29th July. These include radio and television sets and radio-gramophones and their components and accessories; and "fittings and accessories for electric and gas lighting, domestic and office appliances and apparatus operated by electricity or gas, and electric clocks, fans, portable lamps and hand torches, and their components and accessories."

Oil Industry Development

To commemorate the golden jubilee of the *Petroleum Times*, which first appeared as the *Petroleum Industrial and Technical Review* on 18th February, 1899, a special issue of 230pp tells the story of the development of the British oil industry in those years. The historical survey is the work of the editor, Mr. Cecil W. Wood, and is written in chapters, each covering five years. The chronicle is well illustrated.

Increased Lead and Zinc Prices

An immediate increase in the prices of lead and zinc was announced on Tuesday last. The price of good soft pig lead is raised from £81 to £82 7s 6d, and that of good ordinary brand zinc from £60 15s to £63 10s.

Anodized Aluminium Reflectors

Developments During the Past Twenty Years

By V. F. HENLEY, B.Sc., F.R.I.C.

WHEN anodized aluminium, or aluminium coated with aluminium oxide by means of anodic oxidation first became available in about 1923, the oxide coatings obtained were of an opaque grey colour and had poor reflecting characteristics. Semi-transparent anodic coatings date from 1924, when the oxalic acid process was introduced, and from 1928 onward sulphuric acid has been used as an anodizing electrolyte.

TABLE I—TOTAL REFLECTION FACTORS FOR "WHITE LIGHT"

Material	Total Reflection Factor, %
Aluminium matt finish	53
" polished	72
" "Alzak" brightened and anodized ...	85
" sputtered	95
Chrome plate	62–66
Nickel plate...	60–63
Silver plate	90
Stainless steel	65
Rhodium	70–78
Magnesium oxide	98
White porcelain enamelled ...	80
Aluminium paint	75

I first encountered anodized reflectors in 1932, when a quantity of visored floodlights made of commercial quality spun aluminium were treated by the "Alumilite" sulphuric acid process to form a coating about 0.0005in thick. Anodized reflectors for indoor lighting were also produced at that time; the basic surface had to be polished to remove spinning lines and the impressed grain from wooden spinning chucks.

The total reflection factor for polished aluminium is of the order of 72-74 per cent (see Table I) and the slight opacity of the anodic coatings then available reduced it to 60-65 per cent. This reduction was unavoidable at the time, but the lower figure was easy to maintain by periodic cleaning of the reflectors under circumstances in which unprotected polished aluminium would have suffered serious deterioration. Table II demonstrates the efficacy of anodic treatment for protection, although the improvement is better with polished than with matt surfaces.

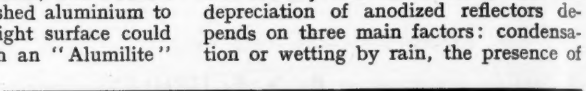
The milky appearance of anodic coatings produced up to 1934 created a "sales resistance" among users of the attractive finishes obtainable by more conventional methods. Little account appears to have been taken of the superior corrosion resistance of anodized aluminium and it is doubtful whether any great progress would have been made without the development of clear coatings.

The first step toward the production of clear specular anodic coatings was due to R. B. Mason, who developed one of

TABLE II—EFFICACY OF TREATMENT

Type of surface	ANODIZED ALUMINIUM			PLAIN ALUMINIUM		
	Initial	After exposure and cleaning	Loss in reflectivity %	Initial	After exposure and cleaning	Loss in reflectivity %
Weathering test on factory roof for three months						
Specular	67.1	66.8	0.4	60.0	50.7	15.5
Diffused	68.0	63.3	6.9	65.9	55.0	16.6
Heat treatment for 500 hours in oven at 250 deg C						
Specular	67.8	65.5	3.4	60.0	55.6	7.3
Diffused	67.5	63.5	5.9	66.0	55.3	16.2
Fume test for 216 hours in exhaust hood of dipping and plating tanks						
Specular	67.3	65.3	3.0	60.0	52.4	12.7
Diffused	67.5	53.0	21.4	66.0	47.3	28.4
Salt spray 500 hours						
Specular	66.7	63.3	4.3	Badly corroded after 168 hours: efficiency about 40%		
Diffused	61.9	56.2	9.2			
Weathering test for three months on factory roof with 150 W bulb burning						
Specular	68.3	66.7	2.4	60.0	48.4	19.3
Diffused	65.1	62.5	4.0	66.0	57.7	12.6

the first electropolishing processes to meet with commercial success. It used a solution of hydrofluoboric acid, which raised the reflectivity of polished aluminium to 85 per cent. The bright surface could then be protected with an "Alumilite" anodic coating with only 2-3 per cent loss of reflectivity.



"Alumilited" fluorescent fitting by C.W.C. Equipment, Ltd.

In America, manufacture was commenced of a "duplex" sheeting consisting of a thin layer of 99.8 per cent pure aluminium on a backing of either 99.3 per cent Al or an Al-alloy containing 1.25 per cent manganese.

What became known as "Alzak" reflectors, made in this way, have been subjected to a wide range of exposure conditions, some of which extended over ten years. In America a test of reflectors

Aircraft landing lamp by Rotax, Ltd., showing "Alzac" processed reflector

without lamps indicated that the loss of reflection in a year for those having a specular finish was 22 per cent and 74 per cent for those with a diffused finish. After cleaning, these loss figures were reduced to 2·5 and 9 per cent respectively.

It is the consensus of opinion, both in this country and in America, that the depreciation of anodized reflectors depends on three main factors: condensation or wetting by rain, the presence of water-soluble corrosive agents such as SO_2 and NaCl, and the precipitation of solid deposits on the reflector surface. The removal of accumulated deposits is best done with a wet cloth or, if thick and adherent, a mildly abrasive cleaner of the soap-pumice powder type.

An addition to commercial electrobrightening was made in 1934 by N. D. Pullen, of the British Aluminium Co., Ltd., who developed the "Brytal" process, which uses an alkaline phosphate-carbonate solution as an electrolyte. Typical reflectivity figures thus obtainable (Table III) were published by Ensor.

TABLE III—"BRYTAL" PROCESS

Specimen	Total reflection factor %	Specular component %	Diffusing component %
Polished commercial Al	73.1	93.1	6.9
"Brytal" on commercial Al ...	76.8	86.2	13.8
"Brytal" on "A" quality Al ...	82.4	96.25	3.75
"Brytal" on 99.99% Al ...	84.1	99.4	0.6
Silvered glass mirror	90.3	almost wholly specular	

Up to 1941 all electrobrightening in this country was carried out by either the "Alzak" or the "Brytal" processes, but at that time pure hydrofluoboric acid was unobtainable so that it was necessary to try more readily available materials. By 1946 two were in commercial use, namely, phosphoric acid and a glycol ether, with or without the addition of sulphuric acid, which enabled better re-

flection factors to be obtained, particularly on high-purity aluminium. The specular reflection factors, confirmed by the National Physical Laboratory, on 99.99 per cent Al electropolished and anodized by the "Alzak" process are 85 per cent mean for a spun parabolic reflector and 87 per cent for flat sheet.

A further development is the chemical bright-dipping processes originated by Alumite and Alzak, Ltd., later improved by the Aluminum Company of America and Vernal S.A. of Switzerland. Table IV shows the reflection factors obtained.

All of these finishes are more or less diffused. The characteristics of the reflecting surface depend on the grade of aluminium used and on the method of processing, while the useful life in service is governed by the frequency of maintenance.

TABLE IV—"ALPOL" PROCESS

Grade of Al, %	Nature of surface	Total reflection factor, %
99.99	Sandblasted	79
	Polished	82.2
Commercial (about 99.3)	Sandblasted	70
	Etched	72
	Polished	77.8

Acknowledgment is due to United Anodising, Ltd., for permission to publish this article and to Alumilite & Alzak, Ltd., for providing the photographs.

Electricity Supply

North Wales Water Power : An Exposed H.V. Line

THE main points of the Council for the Preservation of Rural Wales's case against the hydro-electric proposals for North Wales were made known in a statement issued last week-end. The proposals so far divulged are deplored because as a whole they are considered to constitute a major threat to Welsh country beauty. It is felt that in many cases the advantages to be gained are in no way commensurate with the destruction of amenities. Some of the proposals may have less disastrous effects, and in these the Council's opposition would not be so sweeping. It is intended to "resist to the utmost" any proposals affecting Snowdon and Nant Ffrancon, and the Council is also "inflexibly opposed" to any interference with streams and waterfalls in the Mawddach area. Other schemes to be resisted include the Dolgarrog extension and proposals for the northern or lower level of the Upper Conway. The Council is prepared to entertain conditionally proposals for the Maentwrog extension; the southern or higher level Upper Conway; establishment of a power station and upper and intermediate level reservoirs, suitably camouflaged, in the Mawddach area and an intermediate power station and low-level reservoir in Cym yr Afon Wen, provided the 300ft pipe-line is screened.

Fluorescent Lighting at Bognor

One of the first permanent installations of fluorescent street lighting at a coastal resort was inaugurated when the chairman of Bognor Regis Council recently switched on the lamps in a section of the High Street. The Council hopes ultimately to extend this form of lighting throughout the town. The present installation consists of twelve G.E.C. "Four-Eighty" lanterns, each containing four "Osram" 5ft 80 W "daylight" lamps. Special decorative features have been added to the lanterns. Nine of the lanterns are mounted on existing ornamental steel columns, with new concrete columns of special design, manufactured by Concrete Utilities, Ltd., for the remaining three. The installation was planned by the General Electric Co., Ltd., in collaboration with Major C. F. Green, of the Southern Electricity Board. It provides about 7,600 lumens per 100ft of carriageway. After midnight, two lamps per lantern are switched off to provide half-lighting.

Switch-on in Highland Village

Electricity was brought to Tomintoul, Banffshire, by the North of Scotland Hydro-Electric Board on 20th July, when Colonel H. Gunn, chairman of the Village Council, switched on a lamp in the village square. Nearly 210 of the village's total population of 457, previously dependent on oil for lighting, benefited from the supply immediately, and the remainder will be connected within the next few weeks. To provide the supply, an extension from the existing 11 kV Ballindalloch-Minmore line in Glen Livet has been taken to a point close to the village and then transformed to 415/240 V. The h.v. line is approxi-

mately 8½ miles in length and had to be erected over moor, rock and peat, at an average height of 1,250ft. To withstand the severe weather conditions which prevail in the area, distribution poles had to be specially strengthened by additional side stays. Many of the poles also had to be fitted with bog shoes because of the nature of the ground. The work on the line and on the erection of the poles was carried out by Balfour Beatty & Co. After the ceremony demonstrations of electric cooking were held in the village hall. A street lighting scheme has been prepared by the Hydro-Electric Board and it is hoped to have this in operation by the winter.

Electricity Output

The weekly statement of the Ministry of Fuel and Power shows that 707.6 million kWh was sent out from solid-fuel-fired stations of the B.E.A. and North of Scotland Hydro-Electric Board in the week ended 15th July last. This was 2.6 million kWh less than in the previous week and 12.6 million less than in the week ended 16th July, 1948.

Damage by Voltage Rise

The East Midlands Electricity Board is to replace burnt-out lamps and is issuing a form on which householders can apply for compensation for radio sets, cookers, kettles and other appliances damaged by a sudden rise in voltage recently at Finningley, near Doncaster.

Estate Supply

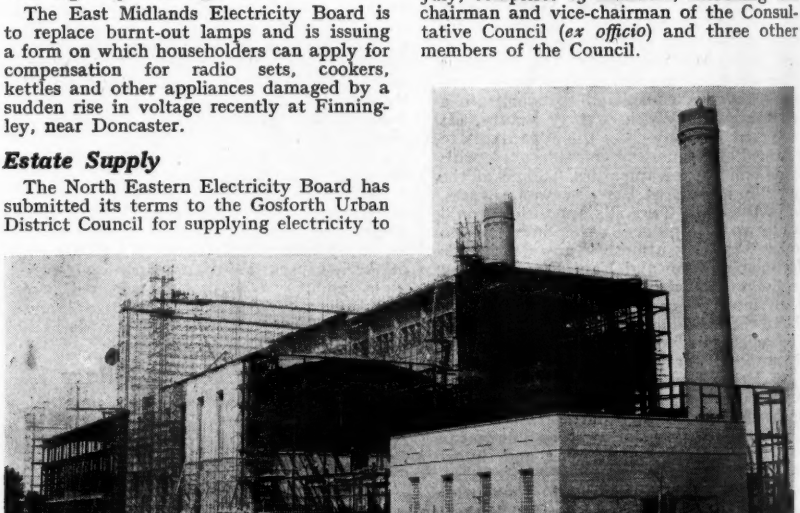
The North Eastern Electricity Board has submitted its terms to the Gosforth Urban District Council for supplying electricity to houses on the Regent Farm housing estate. The Council has agreed to provide a substation site, but not cable ducts for road crossings for both house services and street lighting. It has agreed to hold up the permanent laying of footpaths until the Board has carried out its distribution work, provided the cables are laid in a reasonable time.

"Harnessing the Hills"

A fifteen-minute film on Scottish water power, "Harnessing the Hills," made for the Scottish Office, was shown last Friday at the C.O.I. theatre, London. It will be distributed "non-theatrically" through C.O.I. mobile units and will be available on free loan from the Central Film Library, Imperial Institute, London, S.W.7, from the end of this month.

Local Consultative Committees

The *Eastern Electricity Bulletin* announces the appointment of Local Committees of the Eastern Electricity Consultative Council for each of the Board's six Subareas. The Northmet Local Committee, which held its inaugural meeting on 14th July, comprises 13 members, including the chairman and vice-chairman of the Consultative Council (*ex officio*) and three other members of the Council.



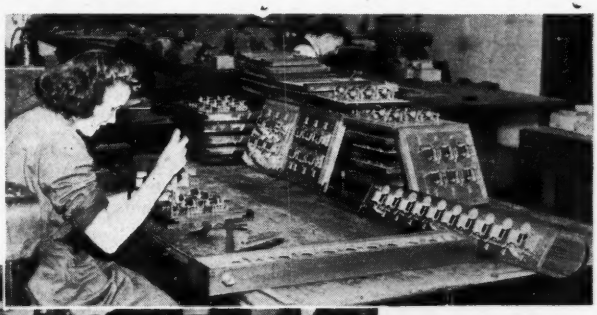
View from the south-west corner of the new Croydon "B" generating station at Beddington Farm Road, Purley Way, with No 1 switch house completed in the immediate foreground. The station, which is expected to be in commission next year, will have an ultimate capacity of 315,000 kW.

New Brentford Factory

LATEST DEVELOPMENT OF A NINETY-FOUR-YEAR-OLD COMPANY

A NEW page is turned in the history of a ninety-four-year-old electrical company with the opening by Julius Sax & Co., Ltd., in Commerce Road, Brentford, of an entirely new factory. Established in 1855 at Bloomsbury for the manufacture of electric bells and telephone instruments, the company moved in 1927 to more extensive premises at West Lodge, Lower Mill, Hammersmith. Here, in an historic house in which Nell Gwynne is said to have lived, it remained until the building was demolished by a flying bomb in 1944, when a move was made to temporary premises in Chiswick High Road. The new factory, though occupying only about the same floor area as the Hammersmith works is much more conveniently arranged, since it is all on one floor and more compact.

Though largely expanded in scope, the company continues to specialize mainly in the production of the range of appliances for which it built up its reputation in the early days of its existence, namely bells, indicators, transformers, signalling apparatus, fire alarms, lighting accessories, etc. A very high proportion of production is for special apparatus and a considerable amount of export business is done, the company having a special Export Department. Among items being made when we visited the works recently were transformers, bells, indicators, lampholders, etc., for export; a large number of bells, indicators, etc., for hospitals; ships' equipment;



(Above) Assembling bell indicators for hospital use

(Left) Bells are made in all sizes from 3in to 10in

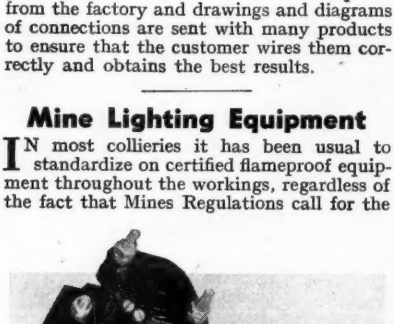
(Below) Ambulance bells being assembled

special continuous ringing bells for export, mounted on raw wood for finishing by customers; ambulance and fire engine bells; lift indicators; under-dome bells; burglar alarms which ring for a predetermined time; push-buttons of all shapes and sizes, including fire alarm units. Of especial interest were bells, etc., mounted on special conduit boxes for the purpose of facilitating installation.

The factory is fully self-contained and has its own cabinet making, coil winding, metal pressing, finishing, tool making and other departments necessary for its various activities. All apparatus is designed with an eye to robustness and long service. Furthermore the company's interest in its products does not cease with their dispatch from the factory and drawings and diagrams of connections are sent with many products to ensure that the customer wires them correctly and obtains the best results.

Mine Lighting Equipment

IN most collieries it has been usual to standardize on certified flameproof equipment throughout the workings, regardless of the fact that Mines Regulations call for the use of truly flameproof gear only over a relatively small area of the mines. Flameproof equipment has often been specified merely to ensure that the robust type of construction associated with Buxton certified equipment is provided.



Simplex non-flameproof watertight lamp unit for colliery lighting

The Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham, is now marketing a new range of non-flameproof lighting equipment for colliery service, which not only costs less than the flameproof equipment but is easier and cheaper to install and maintain below ground. The mechanical construction is in every way suitable for service below ground. The basic design consists of a series of watertight connection boxes with four-way self-aligning socket interiors into which incoming and outgoing armoured cables (with sealing or non-sealing cable terminations) can be directly connected.

Electrical connections to the (e.s. or b.c.) lampholder are made by means of heatproof wiring and plugs engaging directly with the connection box interior. Alterations or extensions may be quickly made by means of the ready connection and disconnection facilities. If desired, cut lengths of cable may be made-off and sealed on the surface, so obviating any sealing below ground. One special feature is the bolting of the lantern into the side of the connection box, which makes the overall height of the fitting the minimum for the well-glass type of construction.

No plastic materials liable to tracking are subject to the heat of the lamp and the system is completely watertight. An equivalent flameproof system is in course of development.

Battery-Charging Plugs

THE first three editions of B.S.74 dealt with 150 A plugs and sockets for charging battery vehicles, differing only in detail. The fourth introduced a 50 A size, the details of which have now been modified by the fifth edition. The withdrawal pull has been reduced, the fixing flange altered to fit dashboard sockets and an alternative means of interlocking has been provided for. Copies are obtainable for 2s from the British Standards Institution, 24, Victoria Street, London, S.W.1.

Pylon Lights

THE 272ft high pylons which carry the 132 kV power lines across the River Orwell at Ipswich have recently been fitted with aircraft warning lights that are switched on and off by G.E.C. photocell equipment, which is actuated by the prevailing amount of daylight. The equipment was installed to the requirements of the consultants (Messrs. Merz and McLellan) for the British Electricity Authority. Each pylon has a set of lights at the top and two other sets 150ft from the ground. The combined photocell, amplifier and relay unit had, owing to the great height of the towers and their lattice-work construction, to be mounted on a 25ft pole so that shadows would never fall across the cell.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

Ultra Electric (Holdings), Ltd.—The consolidated profit and loss account for the year ended 31st March shows a deficiency of £253,153, as compared with a profit of £25,436 for the preceding year. The net trading loss was £89,698, and special losses and provisions amounted to £163,464. No ordinary dividend will be paid (against 5 per cent for 1947-48).

In his statement, Mr. E. E. Rosen (chairman) says that in this country the sellers' market in radio came suddenly to an end in the autumn and business during the last three months of 1948 showed a drastic reduction compared with previous years. Since the end of the financial year trading losses in the radio section have been arrested and the turnover for the first three months is in excess of the corresponding period. Moreover, firm contracts are in hand from Government departments and other sources for various kinds of specialized electronic equipment to several times the value of turnover from similar sources last year.

Thomas De La Rue & Co., Ltd., reports a group profit for the year ended 2nd April, before providing for taxation, of £881,992. In a preliminary statement the company says that owing to the liquidation of the wholly owned operating subsidiaries, the results of which are not included in the group profit, the figure of £528,815 for last year is not a true comparison. The comparable adjusted profit would be £629,174. Provision for group taxation amounts to £566,342 (against £347,521). Capital reserve receives £141,851, and it is proposed to pay a final ordinary dividend of 35 per cent, maintaining the distribution for the year at 50 per cent. The balance carried forward is £353,773.

Murex, Ltd., reports a profit for the year ended 30th April last of £282,000, after providing £298,000 for taxation. This compares with a profit of £215,000 and taxation provision of £220,000 for the previous ten months. It is proposed to pay a final ordinary dividend of 12½ per cent, making 20 per cent, less tax, for the year. The distribution is at the same annual rate as for the previous ten months.

Associated British Engineering, Ltd., in a preliminary statement, shows a consolidated net profit of £43,806, after providing for taxation, for the year ended 31st March last, to which is added £16,378 brought in. It is proposed to pay an ordinary dividend for the year of 12 per cent, less tax (same). It is also proposed to distribute a scrip bonus of £4 new ordinary stock for every £21 ordinary stock held. The directors state that the accounts show the expected effect of the merger of the company's former main subsidiaries with the Brush Electrical Engineering Co. Before the merger the company's principal income was derived from these subsidiaries, and will in future be replaced by dividends on its stock holdings in Brush acquired in the merger.

Strand Electric Holdings, Ltd., reports a net profit of the operating company of £49,121 for the year ended 30th April last, as compared with £48,267 for the preceding year. General reserve receives £6,000 and the gross dividend from the operating company to the holding company is £21,146 (against £20,751). The dividend for the year is unchanged at 17½ per cent.

Enfield Cables, Ltd., announces that the recent offer to shareholders of 500,000 4½ per cent £1 cumulative second preference shares at par and 200,000 £1 ordinary shares at 27s 6d per share was over-subscribed.

Mather & Platt, Ltd., are again paying an interim dividend of 4 per cent.

New Companies

Anglow Electrical Appliances, Ltd.—Registered 13th July. Capital £10,000. To acquire the business of manufacturer, wholesale and retail seller of electrical appliances carried on by G. F. Thompson, at 241-3, Heigham Street, Norwich. Directors: G. F. Thompson, S. Thompson and Mrs. Hilda M. Thompson. Solicitors: Emmett & Tacon, 17, Bank Plain, Norwich.

Atkinson, Murphy & Ferriday, Ltd.—Registered 15th July. Capital £2,000. Manufacturers of and dealers in wireless and television sets and components, etc. Directors: E. Murphy, J. Atkinson and D. Ferriday. Regd. office: 87, Notting Hill Gate, W.2.

Southern Rentals (Worthing), Ltd.—Registered 15th July. Capital £100. Dealers in and hirers of wireless and television apparatus, refrigerators, cooking equipment, etc. Directors: M. A. Findon and G. Sellar. Solicitors: Malcolm Wilson & Cobby, 74, Goring Road, Worthing.

Bowthorpe Holdings, Ltd.—Registered 16th July. Capital £100. Manufacturers of and dealers in electrical and engineering apparatus, insulated cables and wires for transmission of electrical energy, cable binding, marking and insulating apparatus, rubber, synthetic rubber and plastic articles,

wireless parts, etc. Directors: J. Bowthorpe, R. A. Parsons (directors of Hellermann Electric, Ltd., Bowthorpe Electric Co., Ltd., and Bowthorpe Engineering Co., Ltd.), A. G. C. Lloyd (director of above and other companies), and M. L. Miller. Regd. office: Tinsley Lane, Crawley, Sussex.

Hockley Electric Motor & Engineering, Ltd.—Registered 18th July. Capital £1,000. Directors: R. J. Hockley and E. I. Hockley. Regd. office: 7, Granville Road, Broadstairs, Kent.

Electrovision Components Co., Ltd.—Registered 18th July. Capital £100. To acquire the business of Electrovision & Components Co., and to carry on the business of electricians, radio and television engineers, etc. Directors: E. A. Porritt and Geo. W. Battle. Regd. office: 65, Malham Road, Forest Hill, S.E.23.

Midlands T.R.D. Service, Ltd.—Registered 18th July. Capital £500. Dealers in and exporters, importers, manufacturers and repairers of television, wireless, radio and other apparatus, etc. Directors: R. Bell-Jones and H. A. Curtis, 83, Christian Fields, Norbury, S.W.16.

Clifford Butler (Television), Ltd.—Registered 18th July. Capital £5,000. Manufacturers of and dealers in television apparatus of all kinds, etc. Directors: W. C. Butler and J. A. Oliver. Regd. office; 25, Mansfield Road, Nottingham.

A. J. Warner & Co., Ltd.—Registered 18th July. Capital £4,000. To acquire the business of a wireless and electrical engineer carried on by A. J. Warner at Chippenham, Wilts. Directors: A. J. Warner and Winifred M. Warner. Regd. office: The Bridge, Chippenham.

George Buckingham, Ltd.—Registered 15th July. Capital £5,000. To acquire the business of an electrical engineer carried on by G. Buckingham, at 20, Kelross Road, Highbury Park, N. Directors. G. Buckingham and Mrs. Joan P. Buckingham. Regd. office: 20, Kelross Road, N.5.

Grubb Engineering Co., Ltd.—Registered 14th July. Capital £15,000. Manufacturers of and dealers in immersion heaters of all kinds, thermostatic control, electrical and general engineers, etc. Subscribers: E. W. B. Cotterell and L. Owen. Regd. office: Lombard House, 144, Great Charles Street, Birmingham, 3.

Technical Representation (Electrical Equipment), Ltd.—Registered 19th July. Capital £100. To represent manufacturers and to supply particulars regarding the products of such manufacturers; to take care of regular delivery, the correct erection of plant, installation and apparatus, etc. Directors: J. Moffat and I. B. Boston. Regd. office: 4, Broad Street Place, London, E.C.2.

A. E. Hoyle, Ltd.—Registered 20th June. Capital £1,500. Domestic engineers, manufacturers and dealers in domestic and general electrical and other equipment and appliances, etc. Directors: A. E. Hoyle and Mrs. E. Hoyle. Secy.: Ethel Watford. Registered office: 24, City Road, London, E.C.1.

Surbiton Super Batteries, Ltd.—Registered 23rd June. Capital £2,000. Manufacturers and dealers in accumulators, batteries, acids and containers, etc. Directors: E. S. Robson and G. Samuel. Secy.: J. L. Danks. **Regd. office: 52b, Victoria Road, Surbiton.**

John Sills, Ltd.—Registered 6th July. Capital £100. Manufacturers, distributors, exporters and importers of power transformers and electrical and mechanical apparatus, components and allied commodities, machinery and equipment, etc. Directors: W. J. Sills and F. G. Linton. Regd. office: 48-50, Bulwer Road, New Barnet.

Silcocks Bros. (Bristol), Ltd.—Registered 4th July. Capital £1,000. To acquire the business of a wholesale distributor of radio and electrical goods carried on by L. W. J. Silcocks, at 225-7, Cheltenham Road, Bristol, as Silcocks Bros. Directors: L. W. J. Silcocks, G. P. Gibbons and D. R. Bates. Regd. office: 225-7, Cheltenham Road, Bristol, 6.

Increases of Capital

Southern United Telephone Cables, Ltd.—Increased by £250,000, in £1 shares, beyond the registered capital of £500,000.

Insulating Sleevings and Tapes, Ltd.—Increased by £10,000, in £1 shares, beyond the registered capital of £5,000.

Liquidations

The County Electrical Co. (Pendleton), Ltd.—Members' voluntary winding-up. Meeting of members on 19th August at 8, Chatham Street, Manchester, to receive an account of the winding-up by the liquidator, Mr. H. T. Blood.

Wm. F. Brown Radio, Ltd.—Winding-up voluntarily. Liquidator, Mr. F. H. A. Gittins, Priory Street, Dudley.

Bankruptcies

T. Bickerstaffe, residing and carrying on business at 131, Ribbleton Lane, Preston, Lancs, electrical contractor.—First and final dividend of 1s 1¾d in the £, payable 12th August, at the Official Receiver's office, 20, Byrom Street, Manchester.

STOCKS and SHARES

THE shadow of possible labour trouble on the railways has exercised a more powerful effect upon Stock Exchange markets than did the conclusion of the dock strike. The return of the dockers to work on Monday was preceded in the Stock Exchange by a faint revival in prices but this speedily faded out when the railwaymen's demands came more prominently into the picture. Most of the British Government stocks have given way sharply, and British Transport Threes are weak at 94¼, with British Electricity Threes at 98⅜. Holders of nationalized gas stocks, by the way, are disgruntled by the price, 93¼, to which their new stock has fallen.

Week's Fluctuations

Johnson & Phillips at 63s 6d have put on 1s 6d; Joseph Lucas rose 2s 6d to 75s. B.I. Callender's at 33s and London Electric Wire at 44s 6d are both 1s higher. Revo and Telegraph Constructions, both 50s, and De la Rue, 28s 9d, are 1/8 up. On the other hand, Telephone Properties weakened 1s 9d to 9s 6d, and Electric Constructions are 6d lower at 49s 6d. British Electric Traction deferred, 1535, is down 50 points. Babcock & Wilcox new shares are revolving round a premium of one penny. E. K. Cole gained 6d, hardening to 11s 6d, and Decca held their previous advance to 16s 3d. Cossor reacted to 5s 6d. Sixpenny rises made Burco 18s 9d, Crompton Parkinson 23s, Ever Ready 28s, Hall Telephone Accessories 13s, and Oldhams 8s 9d.

Globe & Murex Reports

Globe Telegraph & Trust ordinary hardened a trifle to 40s 6d in sympathy with a rise of 3 to 234¼, in Cable & Wireless ordinary. The Globe Telegraph report, to 30th June last, sets out, in conservative manner, the financial position of the company. As already announced, the dividend continues at the 5 per cent free of tax that has been paid for some time past. The Murex report fellows hard upon the heels of the company's proposal to capitalize £1,000,000 of its reserves and to give the shareholders a scrip bonus of 100 per cent. The price of the shares remains unchanged at 93s 9d, and the dividend, as already announced, again makes 20 per cent for the year.

Parmiter Hope's Bonus

Parmiter Hope & Sugden have celebrated their jubilee, and a 50 per cent increase in the year's net profit, by adding a special 20 per cent bonus to the 30 per cent dividend. Even after deducting a jubilee gift of over £10,000 to employees, the dividend by itself appears to be covered practically six times over. Since the announcement, the 1s shares have changed hands at about 5s x.d. They show a yield of 6 per cent on the dividend, or 10 per cent on the total distribution.

Miscellaneous Matters

A good reception met Whitehall Electric's capital proposals. These arise from the nationalization of the home electricity interests, as a result of which a large proportion of the company's capital is now represented by cash and securities. Part of this is to be returned to stockholders by the repayment of 25 per cent of both the 6 per cent preference and ordinary capital, the former to receive, with the latter's concurrence, a premium of 5s per £1 of stock repaid. The preference are 1s higher at 23s 6d. Movements in Vactric shares became increasingly erratic in anticipation of the annual report and of the news for which shareholders have apparently been waiting since the offer of 25s per share for the managing director's interests a few months ago. The price is 3s 9d lower at 13s 9d.

Scottish Cables

Results published by Scottish Cables earlier this month, for the year ended last April, showed a surplus of £100,000, after tax and the preference dividend. This gives earnings of over 70 per cent on the £250,000 ordinary capital, on which the dividend is maintained at 30 per cent. Reserves have been raised in consequence to over £200,000, with net liquid assets of more than half-a-million, and orders in hand 60 per cent higher than when the last financial year started. The position gives an impression of notable strength. Since their market introduction, just a year ago, the 4s shares have moved within the narrow limits of 25s 6d and 22s 3d. They stand now at 22s 6d, to yield £5 6s 8d per cent.

Preference Issues

Both Enfield Cables and Babcock & Wilcox combined a preference issue with their offers this month of ordinary shares. In the case of Enfield Cables half-a-million 4½ per cent second preference shares were offered at 20s. They rank after the existing 7½ per cent preference shares, which, quoted at 35s, yield £4 5s 9d per cent. Babcocks are issuing two million 4 per cent redeemable preference shares, also at par. Small amounts of preference shares already in existence are quoted nominally on about a 4 per cent basis. Response to the offer of both issues will be noted with practical interest by the investment community and by other enterprises short of working capital.

Norwegian Imports

Substantial Increase Last Year

IMPORTS of electrical machinery and apparatus into Norway last year increased by roughly one quarter compared with 1947. Their total value was kr. 143 million. All the important groups, except radio material, shared in the advance, as will be seen from the accompanying table. Norway's chief suppliers of these goods were Great Britain, Sweden, Holland, United States, Denmark, and France. In 1948 Norway exported a small quantity of cable, and telegraph and telephone apparatus. (The Norwegian krone = 1s approx).

Class	1948 Kr(000)	Inc. or dec. on 1947 Kr(000)
Electric motors	25,922	+ 9,508
Generators	7,452	+ 3,407
Transformers	3,766	+ 1,164
Battery parts	4,219	+ 3,290
Accumulators and parts ...	2,628	+ 1,371
Incandescent lamps	5,402	+ 5,273
Radio apparatus	5,254	− 6,323
Radio valves	4,083	+ 2,584
Wireless telegraph, etc., material	5,574	+ 5,381
Lead covered cable up to 40 mm diam	2,572	+ 1,529
Ditto, 40-80 mm diam. ...	2,686	+ 398
Ditto, over 80 mm diam. ...	51	− 6
Other electric wire	5,107	+ 4,881
Vacuum cleaners	1,188	− 2,458
Porcelain insulators, h.v. ...	2,400	+ 2,215
Porcelain insulators, l.v. ...	1,500	+ 1,401
Other electrical goods	22,170	+19,055

Sweden's Electrical Trade

Large Cable Imports

IN spite of her many highly developed branches of electrical manufacture Sweden is still a net importer of several descriptions of electrical material, e.g., power plant, starting, regulating and switch apparatus, insulated wire and cable, radio apparatus and lamps. At the same time her exports last year of generators, motors, convertors, etc., and of switch and control apparatus showed healthy increases compared with 1947, as also did those of vacuum cleaners, telephone and telegraph apparatus and electro-medical apparatus.

IMPORTS

Class	1948 Kr (000)	Inc. or dec. on 1947 Kr. (000)
Generators, motors, convertors, etc.	35,409	+ 4,330
Vacuum cleaners, fans, etc. ...	12,291	− 23,855
Stators, rotors, current collectors, etc.	3,444	+ 1,307
Accumulators	1,687	+ 386
Lamps, metal filament ...	4,489	− 3,843
Lamps, mercury vapour, etc. ...	4,214	− 4,850
Carbons for electro-tech. purposes	7,174	+ 1,483
Starting, regulating, control and switch apparatus	12,628	− 2,166
Porcelain insulators	3,474	+ 489
Cable, metal-clad	36,669	+ 12,415
Insulated wire	13,324	− 4,001
Electric stoves	795	− 912
Radio apparatus	21,618	− 2,909
Electro-medical, etc., apparatus	20,792	+ 1,224

EXPORTS

Class	1948 Kr. (000)	Inc. or dec. on 1947 Kr. (000)
Generators, motors, convertors, etc.	29,090	+ 8,914
Vacuum cleaners, fans, etc. ...	16,364	+ 2,600
Accumulators	9,759	+ 1,149
Lamps	1,167	− 112
Starting, regulating, control and switch apparatus	9,478	+ 5,496
Cable, metal-clad	1,678	− 287
Telegraph and telephone apparatus	38,185	+ 10,059
Radio apparatus and valves ...	10,022	− 2,355
Electro-medical, etc., apparatus	20,283	+ 10,622

The values last year of the imports and exports of the principal groups of electrical goods are shown in the accompanying tables, with notes of increases or decreases compared with 1947. (Kr. 14.50 = £1.)

Export of Power

Proposed Norway-Denmark Link

IN conection with inter-Scandinavian economic discussions the question was raised whether it would be possible for Norway to export a certain amount of electric power to Denmark and thus contribute to relieving a difficult power supply situation in that country. Although Norway itself needs an extended water-power supply for reconstruction and to permit the completion of present plans for the rationalization and expansion of the country's manufacturing industries, it was found that by an expansion of the Solbergfoss power plant in south-eastern Norway, some 50,000 h.p. could be made available for export to Denmark during seven months of the year. Such export should not seriously interfere with the Norwegian power supply as there is usually a certain amount of surplus power in the summer. It is anticipated that a satisfactory solution of the transmission problem will be arrived at. The power will be delivered from the Norwegian plant at 130 kV a.c. and transmitted over the Swedish system where it will be stepped up to 220 kV. From Helsingborg, on the Swedish side of the Sound, a submarine cable will be laid to the nearest point on the Danish coast.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1945

645. British Thomson-Houston Co., Ltd., and Walker, J. H.—Heteropolar inductor alternators. 8th January, 1945. (625,887.)

8214. British Thomson-Houston Co., Ltd.—Electromagnetic switches. 4th April, 1944. (625,804.)

10246. British Thomson-Houston Co., Ltd.—Refrigerating systems. 26th April, 1944. (625,805.)

16552. Cossor, Ltd., A. C., and Bedford, L. H.—Radio navigational systems for aircraft. 28th June, 1945. (625,891.)

18536. British N.S.F. Co., Ltd., and Smith, K. G.—Electrical condensers or the like. 19th July, 1945. (625,806.)

28346. Igranic Electric Co., Ltd.—Means for effecting speed control of electric motors. 26th October, 1944. (626,125.)

32577. British Thomson-Houston Co., Ltd.—Transformer circuits. 4th December, 1944. (626,126.)

34457. Jennings, H. W. K. (Telefon Fabrik Automatic Aktieselskabet).—Teleprinter exchanges. 19th December, 1945. (625,893.)

1946

818. Richardson, E. C.—Arc lamp. 9th January, 1946. (625,812.)

1240. British Thomson-Houston Co., Ltd.—Permeability tuned radio receiver circuits. 19th January, 1945. (625,968.)

5085. Painton & Co., Ltd., and Benham, C. M.—Electrical resistors. 18th February, 1946. (626,128.)

8821. S. Smith & Sons (England), Ltd., Meredith, F. W., and Campbell, I. C. M.—Automatic electric temperature control systems. 21st March, 1946. (625,815.)

11411. Amsler, M. — Electrically-operated dry shavers. 13th April, 1945. (625,817.)

13735. Compagnie Générale de Télégraphie sans Fil.—Amplifier valves for ultra-short waves. 14th February, 1941. (625,901.)

13825. Marconi's Wireless Telegraph Co., Ltd.—Magnetrons. 22nd March, 1945. (625,902.)

14268. Marconi's Wireless Telegraph Co., Ltd.—Coupled tuned circuits. 12th May, 1945. (626,129.)

14456. Welding Supplies, Ltd. (Elektriska Svetsningsaktiebolaget).—Automatic control systems for arc welding with two or more electrodes. 13th May, 1946. (626,058.)

14762. Krebs & Co. Kommanditges.—Method for the purifying by electrostatic precipitation of halogens, more particularly of chlorine, when produced by electrolytic processes. 7th January, 1946. (626,059.)

15156. Etablissements Merlin & Gerin.—Devices for testing short circuit of high-power continuous-current switches. 14th September, 1943. (626,130.)

16550. Philips Lamps, Ltd.—Holder for an electric-discharge tube and associated circuit components. 24th March, 1942. (626,131.)

17198. Frank, E.—Snap-action electric switches. 6th June, 1946. (625,904.)

18031. Philips Lamps, Ltd.—Synchronization in television facsimile-telegraph and like receivers. 15th June, 1945. (626,132.)

19075. Philips Lamps, Ltd.—Reproduction of sound track records cut into a carrier. 23rd October, 1939. (625,823.)

19649. Landis & Gyr Soc. Anon.—Tuned circuit for use in installations having superposed audio-frequency currents. 6th July, 1945. (625,906.)

20503. Metropolitan-Vickers Electrical Co., Ltd., Stuart-Williams, R., and Shand, G.—Automatic frequency control of radio frequency oscillators. 9th July, 1946. (625,977.)

20509. Metropolitan-Vickers Electrical Co., Ltd., and Scoles, G. J.—Apparatus for receiving recurrent electric signals. 9th July, 1946. (625,824.)

20654. Bendix Aviation Corporation. — Electrical regulators of the variable compression type, such as carbon pile regulators. 25th August, 1945. (625,825.)

21194. Sadir-Carpentier.—Radio direction finding. 27th October, 1944. (626,133.)

22760. Siemens Bros. & Co., Ltd., and Christian, D. A.—Electric selecting systems. 31st July, 1946. (626,065.)

22865. Compagnie Générale de Télégraphie sans Fil.—Filters for guided electromagnetic waves. 16th June, 1943. (625,980.)

22981. Radio Corporation of America.—Multi-range oscillator system. 1st August, 1945. (625,908.)

24650. Goodman, H.—Automatically controlled electrical pumping units. 19th August, 1946. (626,068.)

24983. O'Brien, W. J.—Generators for signals of short duration. 27th August, 1945. (625,983.)

25084. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Electromagnetic measuring instruments. 3rd November, 1942. (626,134.)

27179. British Thomson-Houston Co., Ltd., and Smeaton, T. F.—Lubricant for use in wire drawing. 10th September, 1946. (625,833.)

28011. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Stereophonic radio and the like apparatus. 19th March, 1943. (625,914.)

28251. Philips Lamps, Ltd.—Amplifier circuits having a constant or substantially constant gain. 19th March, 1943. (625,915.)

28300. Standard Telephones & Cables, Ltd.—Electric filters. 4th May, 1945. (626,135.)

28960. Standard Telephones & Cables, Ltd., and Moody, N. F.—Display arrangements for cathode-ray oscillographs. 27th September, 1946. (625,916.)

28962. Standard Telephones & Cables, Ltd., and Moody, N. F.—Time-base circuits for oscillographs. 27th September, 1946. (626,136.)

29663. J. B. Pierce Foundation.—Feed units for electrical wiring systems. 29th March, 1946. (626,138.)

30296. Lundberg, C. E.—Electrically driven kitchen machines. 18th July, 1946. (625,842.)

31083. Saia Akt.-Ges. für Schaltapparate.—Multi-position snap-action electric switch. 18th October, 1945. (626,139.)

34307. Radio Corporation of America.—Electrical resonant circuit arrangements and devices. 19th November, 1945. (626,140.)

34545. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Devices for the stereophonic transmission of sound vibrations. 17th May, 1943. (626,086.)

35196. Philips Lamps, Ltd.—Electrical systems for the automatic control of volume, frequency or the like. 1st June, 1943. (626,088.)

36349. Metropolitan-Vickers Electrical Co., Ltd., Harmsworth, A., and Scoles, G. J.—Radio frequency apparatus. 9th December, 1946. (625,857.)

36676. Cole, Ltd., E. K., and Woodhall, N. M.—Radio receivers provided with an alarm device. 12th December, 1946. (625,929.)

37201. McGee, J. D.—Electron-discharge devices such as television transmission tubes. 18th December, 1946. (626,141.)

37577. Philips Lamps, Ltd.—Thermionic valve apparatus. 14th September, 1943. (626,142.)

37805. Garlick, J.—Coupling circuits for amplifiers. 24th December, 1946. (626,143.)

1947

913. Westinghouse Electric International Co.—Current collectors. 12th January, 1946. (626,092.)

981. Union Totalisator Co., Ltd., and Handley, J.—Means for recording the indications of an electrically controlled indicator. 10th March, 1947. (625,865.)

1118. Plessey Co., Ltd.—Shaft seal for electrical

circuit control. 11th January, 1946. (625,866.)

1742. Humphreys, M. N.—Contact assemblies for electric contactors, swtichgear and the like. 20th January, 1947. (625,936.)

2454. Philips Lamps, Ltd.—Oscillographs. 5th January, 1944. (625,939.)

4529. Kent Alloys, Ltd., and Yeomans, J. E.—Temperature-responsive operating mechanism for electric switches. 17th February, 1947. (626,150.)

4702. British Thomson-Houston Co., Ltd.—Electrical load measuring systems. 18th February, 1946. (625,942.)

5079. Westinghouse Electric International Co.—Electric-discharge switches for high-frequency waves. 20th March, 1942. (625,944.)

5321. Philips Lamps, Ltd.—Electrical low frequency amplifiers. 11th March, 1944. (625,878.)

6173. Thomas, D. G. A.—Thermionic valve circuit-arrangements for handling impulsive electrical variations. 4th March, 1947. (626,152.)

6765. General Electric Co., Ltd., and Friedlander, E. S.—Alternating-current electric motor equipments. 11th March, 1947. (625,950.)

6766. General Electric Co., Ltd., and Friedlander, E. S.—Alternating-current electric motor equipments. 11th March, 1947. (625,951.)

6783. Hazeltine Corporation.—Frequency - modulation radio receivers. 19th March, 1946. (626,154.)

7450. Philips Lamps, Ltd.—Stereophonic sound-recording. 6th June, 1944. (626,157.)

7840. Switchgear & Equipment, Ltd., Oxley, D. A. J., Bergmann, O. O. F., and Oxley, A. G. H.—Electric switchgear. 21st March, 1947. (625,957.)

7848. British Thomson-Houston Co., Ltd.—Insulating and dielectric compositions. 23rd March, 1946. (625,958.)

7991. Standard Telephones & Cables, Ltd., and Cleaver, R. F.—Arrangements for eliminating parallax in indicating instruments. 24th March, 1947. (626,161.)

8133. British Thomson-Houston Co., Ltd.—Electrical conductors. 29th March, 1946. (626,164.)

9009/10. Westinghouse Electric International Co.—Electroplating. 29th September, 1945. (625,989/90.)

9307. British Thomson-Houston Co., Ltd.—Alloys. 11th April, 1946. (626,100.)

9487. Linde Air Products Co.—Welding electrode nozzle. 23rd April, 1946. (626,102.)

9709. Standard Telephones & Cables, Ltd.—Variable-frequency oscillators. 14th June, 1946. (626,103.)

10054. Clarke, Chapman & Co., Ltd., and Vickers, H.—Polyphase alternating-current commutator motors. 16th April, 1947. (625,995.)

10782. Standard Telephones & Cables, Ltd., Eedon-Clarke, C. E., and Kirby, S. G. — High-frequency electric heating equipment. 22nd April, 1947. (626,001.)

11564. Benjamin Electric, Ltd.—Lighting fixtures. 3rd May, 1946. (626,006.)

13526. Westinghouse Electric International Co.—Holders for welding electrodes. 21st May, 1946. (626,012.)

13929.—Measurement, Ltd., and Hewlett, S. J.—Electric switches having arcing contacts. 23rd May, 1947. (626,179.)

15406. Metropolitan-Vickers Electrical Co., Ltd., and Bosley, W.—Betatrons for generating X-rays. 11th June, 1947. (626,183.)

17353. Thermega, Ltd., and Swindells, V. E.—Electric overload protective devices. 1st July, 1947. (626,023.)

18261. American Air Filter Co., Inc.—Electric gas cleaners. 3rd September, 1940. (626,189.)

20135. Western Electric Co., Inc.—Negative-feedback amplifiers. 12th January, 1943. (626,191.)

21232. Metals & Controls Corporation.—Protective arrangements for polyphase electrical apparatus. 15th September, 1939. (626,114.)

21918. Standard Telephones & Cables, Ltd.—Mercury vapour turbine generators. 20th February, 1946. (626,035.)

22581. J. A. Crabtree & Co., Ltd., and Morgan, R. W.—Electric sockets. 14th August, 1947. (626,115.)

22589. J. A. Crabtree & Co., Ltd., and Morgan, R. W.—Electric fuse terminals. 14th August, 1947. (626,116.)

22591. Westinghouse Electric International Co.—Dynamo electric machines. 15th August, 1946. (626,118.)

22674. Winther, M. P.—Eddy current couplings. 14th September, 1946. (626,119.)

22830. J. A. Crabtree & Co., Ltd., and Hill, W. E.—Electric switch fuses. 16th August, 1947. (626,194.)

22888. British Thomson-Houston Co., Ltd., Gimson, C. F., and Veale, R. H. — Liquid-break electrical circuit-breakers. 18th August, 1947. (626,198.)

23569. Metropolitan-Vickers Electrical Co., Ltd., Ludlow, J. H., and Bennetts, H. G.—Induction heating. 26th August, 1947. (626,038.)

24151. English Electric Co., Ltd., and Jowett, W. G.—Automatic electric regulators. 14th August, 1946. (626,202.)

24330. Metropolitan-Vickers Electrical Co., Ltd., and Liversidge, J. H.—Electrical control and indicating systems employing selsyn devices. 3rd September, 1947. (626,039.)

24359. Ever Ready Co. (Great Britain), Ltd., and Ludford, E. H.—High-tension batteries. 3rd September 3rd, 1947. (626,040.)

35190. Philips Electrical, Ltd.—Wire seals particularly for use in incandescent lamps and discharge tubes. 27th May, 1939. (626,203.)

1948

32144. Zellweger, Ltd., and Grob, O.—Receiving apparatus for electrical remote-control systems. 13th December, 1945. (626,043.)

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 20th July:—

EGA (design). No. 672,551. Class 7. Spraying machines.—Ega Electric, Ltd., Holyhead Road, Wednesbury, Staffs.

HIS MASTER'S VOICE (design). No. 674,715. Class 7. Washing, ironing, drying, wringing, dishwashing, food mixing, food mincing, fanning and blowing and electric food grating machines, and parts of and fittings for all such goods all included in Class 7. No. 674,717. Class 11. Apparatus for heating, steam generating, cooking, drying and ventilating, and parts and fittings, all included in Class 11.—The Gramophone Co., Ltd., Blyth Road, Hayes, Middx.

MEMEDA. No. 671,338. Class 9. Electrical apparatus and instruments included in Class 9, wireless sets (complete) and parts included in Class 9.—Midland Electric Manufacturing Co., Ltd., M.E.M. Works, Reddings Lane, Tyseley, Birmingham, 11.

BRITLOK. No. 674,176. Class 9. Electrical apparatus and instruments included in Class 9. C. H. Parsons, Ltd., Britannia Works, Wharfdale Road, Tyseley, Birmingham, 11.

PYROVAC. No. 651,304. Class 11. Electric panel beaters, immersion heaters and cookers.—Scottish Heat and Vacuum, Ltd., Stanley Works, Abbot Street, Arbroath, Scotland.

DEODAZONE. No. 674,015. Class 11. Electrical apparatus for generating ozone for air purifying and air conditioning.—Arthur Green, Wilga, Warwick Avenue, Coventry.

BRADCO. No. 675,929. Class 11. Refrigerators.—Braddicks Electrical, Ltd., 15, Bridgeland Street and 31, Mill Street, Bideford, Devon.

ELECTROPARK. No. B674,052. Class 12. Electrically operated land vehicles, and parts included in Class 12.—Northern Coachbuilders, Ltd., Claremont Road, Newcastle-upon-Tyne, 2.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Ashton-under-Lyne.—12th August. Housing Committee. Electric wiring of 106 houses. (See this issue.)

Australia.—BRISBANE.—5th August. City Electricity Department. H.v. a.c. testing equipment and sphere gap voltmeter. (CRE. (IB). 19013/49. Ten/503).*

Belfast.—9th August. Ministry of Commerce. Electrical installation in a new factory extension at Falls Foundry. (22nd July.)

Blackpool.—15th August. Borough Council. Three electrically operated penstocks at Gynn screening station. A. Hamilton, borough surveyor, Municipal Offices.

Dagenham.—8th August. Corporation. Street lighting, Heath Park estate. (22nd July.)

Hambledon.—12th August. R.D.C. Two 4in sewage pumps and two 6-7½ b.h.p. slip ring electric motors, in connection with extensions to Bramley and Wonersh sewage disposal works. S. P. Youldon, surveyor, Council Offices, Bury Fields, Guildford.

India.—MADRAS.—14th September. Department of Electricity. One 10,000 kW turbo-alternator, boilers, transformer and switchgear for Madura Thermal Scheme. (C.R.E. (I.B.) 18760/49. Ten/491.)*

Kincardine.—6th August. County Council. Electrical work in connection with twenty traditional houses to be built at Fetteresso, Muchalls and Marykirk. County architect, 34, Market Square, Stonehaven.

Manchester.—22nd August. Highways Committee. Supply of 4,750 globes for street lighting. (See this issue.)

Education Committee. Additions to the electrical installation at Royal Oak School, Wythenshawe. (22nd July.)

Merton and Morden.—17th August. U.D.C. Street lighting installations. (See this issue.)

New Zealand.—WELLINGTON.—1st November. State Hydro-Electric Department. 66 kV outdoor switchgear. (CRE. (IB). 19335/49. Ten/504.)*

Queensbury and Shelf.—20th August. U.D.C. Sodium street lighting equipment. (See this issue.)

Ross and Cromarty.—20th August. County Council. Electrical installations at Council properties in the Gairloch district and part of the Easter Ross area. County architect, The Old Academy, Dingwall.

South Africa.—DURBAN.—30th September. Electricity Department. Electric cable. (C.R.E. (I.B.) 19472/49. Ten/509.)*

CAPE TOWN.—19th September. Electricity Department. Overhead line material. (C.R.E. (I.B.) 19426/49. Ten/510.)* 22nd September. Supply of 27,000 electric lamps (C.R.E. (I.B.) 19790/49. Ten/512.)*

21st September. City Electricity Department. Bare copper conductors. C.R.E. (I.B.) 19791/49. Ten/517.)*

Stoke-on-Trent.—9th August. Town Council. Electric lamps for six months to 31st March, 1950. City surveyor, Town Hall.

Southampton.—18th August. Corporation. Electrical installations in flats and houses on Harefield and Millbrook estates. (22nd July.)

Stafford.—Corporation. 13th August. Street lighting electrical equipment. (22nd July.)

Orders Placed

London.—ISLINGTON.—Borough Council. Repairs to the electrical installation at the cleansing station (£142).—London Electricity Board.

Southport Corporation.—Electrical installations at the laboratories at King George V School (£129).—Graham & Caddick.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abertillery.—Re-employment Factory for Disabled Persons' Employment Corporation; T. F. Howells, Ltd., builders, 83, Bartlett Street, Caerphilly.

Ammanford.—Factory, Foundry Road, for O. Jonah & Sons; J. Owen Parry & Lewis, architects, Arcade Chambers.

Ashington (Northumberland).—New coal cleaning plant at Lynemouth Colliery for the Northern Coal Board (£731,000); Mitchell Engineering Group, contractors, Bedford Square, London, W.C.1.

Baillieston.—Cinema, Main Street; McAndrew & K. Jenkins, Royal Bank Buildings, Inverness.

Blandford.—Houses (60), King's Road site; borough surveyor.

Blayden-on-Tyne.—Houses (100); surveyor, Urban Council Offices.

Bolton.—Workshop and office block off Marsden Road; Bolton Motor Co., Ltd.

Bradford.—Rebuilding Waterloo Mills, Nelson Street; John Reddihough, Ltd., woollen merchants.

Bristol.—Fire station, Speedwell; J. N. Meredith, city architect, Eagle House, Colston Avenue.

Bury.—Houses (22), Redvales site; J. E. France, builder, 45, Assheton Road, Failsworth, Manchester.

Chichester.—Houses (153), Parklands estate, and shops and flats at Whyke House estate; city surveyor.

Congleton.—Houses (32), Parson Street site; H. Charlesworth, builder, Gantswood Lane.

Coseley (Staffs).—Houses (316), Old Park Farm; Bridgewater & Shepherd, architects, 42, Bruton Place, Berkeley Square, London, W.1.

Croydon.—Shops and offices, Lower Church Street; South Suburban Co-operative Society, Ltd., 99, London Road.

* Specifications may be inspected at the Commercial Relations and Exports Department, Thames House North, Millbank, S.W.1.

Doncaster.—Technical high school for boys; town clerk, 1, Priory Place.

Dudley.—Kitchen and dining room block at Training College; A. C. H. Stillman, architect, Education Offices, Earl Street, Stafford.

Eccles.—Additions and alterations to Nassau Mill; C. Bradshaw, 41, South King Street, Manchester.

Houses (50), Ellesmere Park estate; W. P. Mitchell (Eccles), Ltd., builders, 178, Wellington Road.

Evesham.—Houses (74); T. A. B. Dempster, architect to R.D.C.

Felling-on-Tyne.—R.C. church at Jingling Gate; Rev. B. Stronge, St. Patrick's Presbytery.

Grimsby.—Rebuilding works after fire; Liverine, Ltd., Fraser Street.

Haltwhistle.—Houses (61); R.D.C. surveyor.

Hendon.—Offices and laboratories, Hill View Gardens; British Launderers' Association, Ltd., Hill View Gardens, N.W.4.

Hereford.—Extensions to factory of John E. Goodwin, Ltd., Three Elms Road; C. Corey, architect, 40, Cotterell Street.

Herne Bay.—Houses (14), Sea Street estate, for U.D.C.; Grosshill Construction Co., Ltd., Greenhill Road.

Horsham.—Additions and alterations to Council Offices, Horsham Park; C. G. Atkinson, U.D.C. surveyor, Council Offices, Park House.

Lancashire.—Alterations and additions to County Institute of Agriculture, Winmarleigh (£11,451); G. Noel Hill, county architect, Preston.

Lincolnshire.—Technical Institute & College, Stamford; C. B. Metcalfe, county architect, Council Offices, Sleaford.

Liverpool.—Model hostel for aged persons, Aigburth Vale (£45,000); city engineer, Municipal Buildings, Dale Street.

London.—HOLBORN.—Public laundry; A. S. G. Cook, borough architect, Town Hall, High Holborn, W.C.1.

HAMPSTEAD.—Dwellings (80), West End Lane; E. B. Glanfield, architect, 6, Raymond Buildings, Gray's Inn, W.C.1.

HENDON.—Dwellings (26), Brent Hill estate; H. Parfitt & Sons, Ltd., builders, Harrow Road, Sudbury, Wembley.

WOOLWICH. — Out-patients' department (£47,500), Memorial Hospital; South-East Metropolitan Regional Hospital Board, 27, Queen Anne Street, W.1.

Longbenton.—Houses (20) for U.D.C.; Fisher and Co., builders, Kenton Lane, Gosforth.

Northallerton.—Houses (14), Brompton and Appleton Wiske, for the R.D.C.; Brierley, Syme and Leckenby, architects, 13, Lendal, York.

Oldham.—Additional classrooms at Werneth County School; Whitworth & Whittaker Co., Ltd., Rochdale Road.

Houses (108), Limeside estate; Cameron & Middleton, surveyors to Borough Council, 88, Mosley Street, Manchester.

Orrell.—Houses (78), Moor Road site; F. Butterfield, surveyor to U.D.C.

Otley.—Houses (50); surveyor, U.D.C. Offices, North Parade.

Portsmouth.—Old people's homes (24), Landport, for Lord Mayor of London's National Air Raid Distress Fund; city architect, 1, Clarence Parade, Southsea.

Redcar.—Houses (40); borough surveyor, Municipal Offices.

Rochester.—Houses (44), St. William's estate; borough engineer.

Romney Marsh.—Houses (37), Taylor's Lane, St. Mary's Bay, for R.D.C.; Jackson & Jackson, architects, 13, North Street, Ashford, Kent.

Rotherham.—Primary School (£110,500), Broom Valley; borough engineer.

Rowley Regis.—Civic restaurant, Reddal Hill Road; borough surveyor.

Salford.—Houses (218), Little Hulton, Worsley; city engineer.

Smethwick.—Houses (197), Perry Hill estate and 28 at Great Arthur Street, borough engineer.

Shops and flats, Norman Road and Pitcairn Road; Birmingham Co-operative Society, Ltd., High Street, Birmingham, 4.

Stanley.—Old people's houses (10), Sunny Terrace, and houses between Annfield Street and Pikesyde; J. R. Heslop, surveyor, U.D.C. Offices, Stanley, Co. Durham.

Stevenage.—Blocks of flats; Stevenage Development Corporation, Aston House.

Sunderland.—Factory at Pallieu for Northern Gas & Instruments, Ltd.; Stephenson & Gillis, Saville Chambers, Newcastle.

Swindon.—Houses (20) and flats (40), Moredon; John Laing & Son, Ltd., builders, Bunns Lane, Mill Hill, N.W.7.

Tarvin.—Houses (10), Clutton; surveyor, R.D.C. Offices, Newgate, Chester.

Tenby.—Infants' school (180 places) for Pembroke E.C.; Walter Barrett, county architect, County Offices, Haverfordwest.

Wallsend.—Infants' school; R. Burke, architect, 10, Lambton Road, Jesmond, Newcastle-on-Tyne.

Wansford.—Houses (24), for Barnack R.D.C.; F. J. Lenton & Partners, architects, 16, Broad Street, Stamford.

Warwickshire.—Infants' school at Stratford-on-Avon; county architect, Shire Hall, Warwick.

Washington.—New offices for the U.D.C.; surveyor.

Wirksworth.—Houses (22), Derby Road estate, and 6 at Steeple Grange; surveyor to U.D.C.

Eye Operation Televised

THE recent televising of surgical operations at University College Hospital has been followed by another demonstration with portable Marconi equipment at St. Thomas's Hospital, London. This time eye operations were televised, including the use of diathermy for detaching the retina. The surgeon operated upon a human eye about 1.5 in. across which was enlarged to 9 in. across on the television screen, thus enabling the viewers to watch the operation with greater ease. Incidentally this hospital figured in one of the earliest wireless experiments in this country. Over fifty years ago Marconi carried two small boxes into St. Thomas's for the purpose of demonstrating his system of wireless communication to members of Parliament on the other side of the River Thames.